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Facilitator Guide



Sector
Construction

Sub-Sector
Real Estate and Infrastructure Construction

Occupation
SHUTTERING CARPENTRY

Reference ID: **CON/Q3001**, Version **2.0**
NSQF Level: 4

SHUTTERING CARPENTER

(Elective: System Formwork / Conventional Formwork)

Published by

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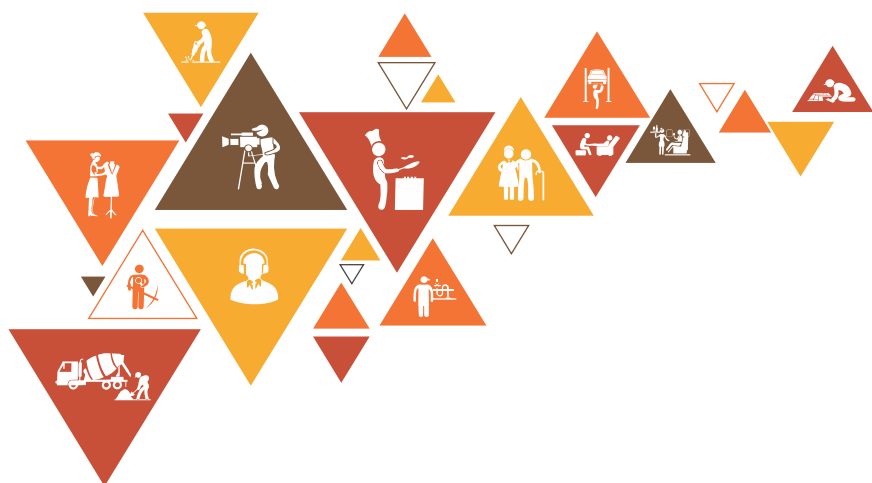
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Shri Narendra Modi
Prime Minister of India

“ Skilling is building a better India.
If we have to move India towards
development then Skill Development
should be our mission. ”



Acknowledgement

We are thankful to all organizations and individuals who have helped us in the preparation of this Facilitator Guide. We also wish to extend our gratitude to all those who reviewed the content and provided valuable inputs for improving the quality, coherence and content presentation of chapters. This Facilitator Guide will lead to the successful rollout of the skill development initiatives, helping greatly our stakeholders particularly trainees, trainers and assessors etc. We are thankful to our Subject Matter Expert for the content and for helping us in the preparation of this Facilitator Guide.

It is expected that this publication would meet the complete requirements of QP/NOS based training delivery. We welcome suggestions from users, industry experts and other stakeholders for any improvement in future.

About the Book

The objective of the guide is to provide an approach map for interacting with the trainees undergoing training in this job role. The course aims to provide both theoretical and practical knowledge to the trainees and also to guide them about Shuttering Carpenter. The guide is neither a substitute nor a complete road map, but an aid to help to pass on the knowledge on all the aspects to the trainees in a systematic manner. It is expected that the trainer is fully conversant with all the contents of the guide. The guide is just to indicate how to proceed in covering a topic and includes some additional information that may be necessary for the trainer to develop better comprehension of the following aspects:

- **Knowledge and Understanding:** Satisfactory operational learning and comprehension to play out the required chore.
- **Performance Criteria:** Pick up the required aptitudes through hands-on preparation and play out the required operations inside the predetermined measures.
- **Professional Skills:** Capacity to settle on operational choices relating to the zone of work.

The job will also include judging comprehension and also help them learn more through hands-on training. But it has to be ensured that these are following the knowledge imparted and time spent on each unit. It is expected that irrespective of the region, knowledge of all aspects will be imparted to trainees.

Symbols Used



Ask



Activity



Do



Demonstrate



Elaborate



Exercise



Facilitation Notes



Field Visit



Learning Outcomes



Notes



Objectives



Tips



Resources



Summarize



Say



Team Activity

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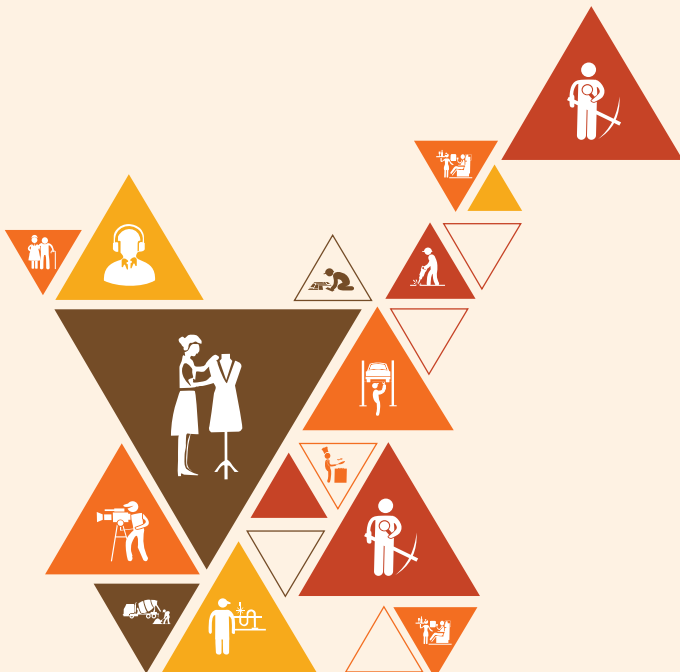


1. Introduction to the Job Role of a Shuttering Carpenter

Unit 1.1 - Overview of Construction Industry in India

Unit 1.2 - Major Occupation in Construction Sector

Unit 1.3 - Shuttering Carpenter - Systems as a Job Role



Bridge Module

Key Learning Outcomes

After the end of this module, participants will be able to:

1. Understand broadly the construction activities in India
2. Differentiate between real estate & infrastructure and rural construction
3. Know about major occupations in construction sector
4. Understand few job roles under each occupation
5. Know about role and duties of a Shuttering Carpenter- System
6. Know about personal and professional attributes under the Shuttering Carpentry
7. Know about career path as a Shuttering Carpenter- System

Unit 1.1: Overview of Construction Industry in India

Unit Objectives

After the end of this unit, participants will be able to:

1. Understand broadly the construction activities in India; and
2. Differentiate between real estate & infrastructure and rural construction.

Resources to be used

- Available objects such as training kit - trainer guide, presentations, whiteboard, marker, projector, laptop, video films, etc.
- PowerPoint slides, pictures/posters and videos depicting various information about the construction industry, types of construction, basic categories of construction projects, and market segments of the construction industry.

Say

- In this session, we shall learn key facts about the construction industry, types of construction, basic categories of construction projects, and market segments of the construction industry.
- Let's begin with an ice-breaking session, introduce yourself and ask participants to introduce themselves.

Team Activity

- **Purpose:** This activity aims to familiarise the participants in the group with one another.
- **Tentative Duration:** 15 Mins
- **Procedure:**
 - ◆ Ask the participants to pronounce their name with an adjective beginning with the initial letter of their name.
 - ◆ Request that they additionally provide a brief introduction of themselves.
- **Expected Outcome:** The outcome of this activity is that the participants will become familiar with each other.

Say

- I hope everyone enjoyed our first activity and now let's move on to the topics covered in this session.

Ask

- What do you understand about the construction industry?
- Do you know how many types of construction are there?

Elaborate

With the help of audio-visual aids and the participant handbook, elaborate:

- Construction Industry
- Construction Industry in India
- Types of Construction
- Construction Project Categories
- Construction in rural India
- Various govt. initiative into Construction sector
- Market Segments of the Construction Industry

Demonstrate

Show a PowerPoint presentation to the class on Construction Industry in India - <https://www.slideserve.com/frieda/construction-sector-in-india-powerpoint-ppt-presentation> and ask participants to note down the important points.

Say

- Let us now perform an activity based on various market segments of the construction industry.

Team Activity

- **Purpose:** The objective of this activity is to introduce participants to the different market segments within the construction industry.
- **Resources Required:** Presentation materials (slides or handouts) explaining market segments in the construction industry, internet access or library resources for research, whiteboard or flip chart with markers, printed construction industry reports or data (optional but helpful), worksheets for students to complete during the activity.
- **Tentative Duration: 60-90 minutes**

- **Methods/Procedure:**
 - ◆ **Step 1: Introduction-** Begin the activity by discussing the importance of understanding market segments in the construction industry. Explain that market segmentation helps professionals identify specialized opportunities and areas of expertise within the broader field of construction.
 - ◆ **Step 2: Presentation-** Deliver a presentation on the different market segments within the construction industry. Include information on residential construction, commercial construction, industrial construction, infrastructure development, and specializations like green building, renovation, and restoration. Use visual aids to make the information more engaging and accessible.
 - ◆ **Step 3: Group Research-** Divide the students into small groups and assign each group a specific market segment to focus on. Provide the groups with access to the internet or library resources to conduct research on their assigned market segment. They should explore the scope, current trends, major players, challenges, and potential career opportunities within their segment.
 - ◆ **Step 4: Group Presentation-** Each group presents their findings to the rest of the class. Encourage them to use visuals, statistics, and examples to support their presentation. Allow for a short Q&A session after each presentation to clarify doubts and exchange insights.
 - ◆ **Step 5: Reflection and Discussion-** Lead a class discussion to debrief the activity. Encourage students to share their thoughts on which market segments they find most appealing and why. Discuss the skills and qualifications required for different market segments and how students can prepare to excel in their chosen area.
- **Expected Outcome:** By the end of this classroom activity, students are expected to:
 - ◆ Understand the concept of market segmentation in the construction industry.
 - ◆ Identify the various market segments within the construction field, including residential, commercial, industrial, infrastructure, and specialized sectors.
 - ◆ Analyze the characteristics, opportunities, and challenges associated with each market segment.
 - ◆ Gain insights into potential career paths and specialization options within the construction industry.
 - ◆ Reflect on their interests and skills to make informed decisions about their vocational course and future career goals in construction.

Say

Did you think the activity improved your understanding? I'm hoping now you have a better idea of the various market segment of the construction industry.

Summarize

- Note down the important points related to the construction industry, types of construction, and various market segments.
- Revise these points with the participants.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topics
- Arrange audio-visual aids for a better understanding of the topics.
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 1.2: Occupation in Construction Sector

Unit Objectives

After the end of this unit, participants will be able to:

1. Know about major occupations in construction sector; and
2. Understand few job roles under each occupation.

Resources to be used

- Available objects such as training kit - trainer guide, presentations, whiteboard, marker, projector, laptop, video films, etc.
- PowerPoint slides, pictures/posters and videos depicting various information about the occupation in construction industry, types of job roles available in construction industry.

Say

- In this session, we shall learn key facts about the various occupation associated with the construction activities, the job roles associated and the profile of the person doing these activities.

Ask

- What are the job roles that you see around you in the construction related activities?
- Can you list down such job roles and the occupation related to it.

Say

- Let us now perform an activity based on various occupations of the construction industry.

Activity

- **Purpose:** The purpose of this activity is to help participants understand and identify the key occupations and job roles within the construction sector in India, and to gain insights into the responsibilities, skills, and requirements associated with each role. It promotes collaboration, research skills, and a deeper understanding of the construction industry.
- **Resources Required:**
Information cards or handouts describing each job role

Access to research materials (internet, books, articles)

Presentation tools (e.g., projector, screen)

- **Tentative Duration:** Approximately 90 minutes
- **Methods/Procedure:**
 - ◆ **Introduction:**
 - Briefly introduce the construction sector's significance in India's economy and its various job roles.
 - ◆ **Role Identification :**
 - Divide participants into small groups.
 - Assign each group a specific job role from the list.
 - Provide information cards or handouts describing the responsibilities, skills, and qualifications for each role.
 - ◆ **Research and Discussion:**
 - In their groups, participants research the assigned job role using the provided information and additional resources.
 - Discuss role responsibilities, required skills, qualifications, and challenges.
 - ◆ **Presentation Preparation:**
 - Each group prepares a 5-7 minute presentation about their assigned job role.
 - Encourage them to use visuals and examples to illustrate key points.
 - ◆ **Group Presentations:**
 - Groups present their findings, covering role responsibilities, skills, qualifications, and challenges.
 - Other participants can take notes during presentations.
 - ◆ **Q & A and Discussion:**
 - After each presentation, open the floor for questions and discussions.
 - Participants can ask clarifying questions and discuss potential collaborations between different roles.
 - ◆ **Reflection and Takeaways (10 minutes):**
 - Facilitate a group discussion on key takeaways from the presentations.
 - Discuss how different roles contribute to construction projects and the sector.
 - ◆ **Application Exercise :**
 - Assign an exercise where participants imagine a construction project and identify necessary job roles.

- This reinforces their understanding of the roles' significance.
 - ♦ **Summary and Conclusion:**
- Summarize the main points covered during the activity.
- Emphasize the importance of teamwork and coordination in the construction sector.

Say

Did you think the activity improved your understanding? I'm hoping now you have a better idea of the various occupation and job role available in the construction industry.

Summarize

- Note down the important points related to the types of occupation and various job roles.
- Revise these points with the participants.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topics
- Arrange audio-visual aids for a better understanding of the topics.
- Ask the participants if they have any questions.

Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 1.3: Role and Responsibilities of a Shuttering Carpenter

Unit Objectives

After the end of this unit, participants will be able to:

1. Know role and duties of a shuttering carpenter - system
2. Know personal and professional attributes under the shuttering carpentry occupation
3. Identify various employment opportunities for a Shuttering Carpenter.
4. Know about career path as a shuttering carpenter – system

Resources to be used

- Available objects such as training kit - trainer guide, presentations, whiteboard, marker, projector, laptop, video films, etc.
- PowerPoint slides, pictures/posters and videos depicting various information about the role and responsibilities, personal attributes, and career path of a shuttering carpenter.

Say

- In this session, we shall learn key facts about the role and responsibilities, personal attributes, and career path of a shuttering carpenter.

Ask

- What do you know about the job role of a shuttering carpenter?
- Do you know the career opportunities available for a shuttering carpenter?

Say

- Let us now perform an activity based on various occupations of the construction industry.

Elaborate

With the help of audio-visual aids and the participant handbook, elaborate:

- Introduction to the job role of shuttering carpenter
- Roles & Responsibilities of a shuttering carpenter
- Various employment opportunities for a shuttering carpenter
- Career Path of a shuttering carpenter

Say

Let us now perform an activity based on the roles, responsibilities and key attributed required for a shuttering carpenter.

Activity

- **Purpose:** The purpose of this activity is to provide participants with a comprehensive understanding of the role of a shuttering carpenter within the construction industry. By delving into the responsibilities, attributes, employment opportunities, and potential career paths, participants will gain valuable insights into this vital occupation.
- **Resources Required:**
 - ◆ Information cards detailing shuttering carpenter role, duties, attributes, employment opportunities, and career paths.
 - ◆ Whiteboard, markers, and projector.
 - ◆ Printed visuals representing different career progression options.
- **Tentative Duration:** Flexible, approximately 60-75 minutes based on group discussion and engagement.
- **Procedure:**
 - ◆ **Introduction:**
 - Welcome participants and introduce the activity's objectives.
 - Emphasize the significance of shuttering carpenters in construction projects.
 - ◆ **Role and Duties Exploration:**
 - Distribute information cards about the role and duties of a shuttering carpenter.
 - Participants review the cards individually and jot down key points.
 - Facilitate group discussions where participants share their findings and insights.
 - ◆ **Attributes Discussion:**
 - Present personal and professional attributes important for shuttering carpenters (e.g., precision, teamwork, adaptability).
 - Encourage participants to discuss how these attributes contribute to successful carpentry work.
 - Share real-life examples to highlight attribute significance.
 - ◆ **Employment Opportunities Brainstorm:**
 - Introduce various employment options for shuttering carpenters, such as construction companies, real estate projects, and self-employment.

- Divide participants into groups for a brainstorming session on additional opportunities.
- Each group presents their ideas, fostering a collective exploration of potential pathways.
- ♦ **Career Path Exploration:**
 - Display a visual timeline illustrating diverse career paths within shuttering carpentry.
 - Discuss advancement prospects, specialized roles, and opportunities for growth.
 - Encourage participants to ask questions and share their perceptions.
- ♦ **Group Discussion and Reflection:**
 - Engage participants in a guided discussion, prompting them to reflect on what they've learned.
 - Encourage sharing of personal insights, surprises, and newfound perspectives.
- ♦ **Q & A Session:**
 - Open the floor for participants to ask questions about the role, attributes, opportunities, or career trajectory.
 - Address queries to enhance participants' understanding.
- ♦ **Conclusion:**
 - Summarize the key takeaways from the discussions.
 - Reinforce the importance of shuttering carpenters in construction and their potential for a rewarding career.
- **Expected Outcome:** Participants will gain an in-depth understanding of the shuttering carpenter's role, its associated attributes, the range of employment opportunities available, and potential pathways for career advancement. The activity aims to foster appreciation for the profession and inspire participants to consider the shuttering carpentry occupation as a viable and fulfilling career option within the construction sector.

Say

There are various career opportunities and necessary skills required to perform the job role of a shuttering carpenter, I'm hoping now you have a better idea of them.

Summarize

- Note down the important points related to the role and responsibilities, personal attributes, and career path of a shuttering carpenter.
- Revise these points with the participants.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Exercise

Key Solutions to PHB Exercise

1.
 - a. Masonry
 - b. Bar Bending and Fixing
 - c. Shuttering Carpentry
 - d. Scaffolding works
 - e. Fabrication
 - f. Rigging
2. A shuttering carpenter, also known as a formwork carpenter, plays a crucial role in the construction industry by creating temporary structures that support freshly poured concrete until it gains enough strength to stand on its own. These temporary structures are called formwork or molds, and they shape and contain the concrete during the curing process.
3. A skilled shuttering carpenter should possess expertise in woodworking techniques, precise blueprint interpretation, strong mathematical capabilities, acute attention to detail, adept problem-solving skills, spatial awareness, physical endurance for construction site demands, effective hand-eye coordination, clear communication skills, a stringent commitment to safety, a collaborative mindset for team coordination, efficient time management, technical proficiency with diverse materials and tools, understanding of concrete properties and curing, adaptability to changing circumstances, organizational skills for task management, a focus on producing high-quality work, and a grasp of mechanical components used in formwork assembly.
4. b) Rural construction development
5. True
6. True
7. False
8. True
9. True
10. False
11. True
12. False
13. Fabrication

Notes



A large rectangular area with a thin orange border, containing 30 horizontal black lines for writing notes.



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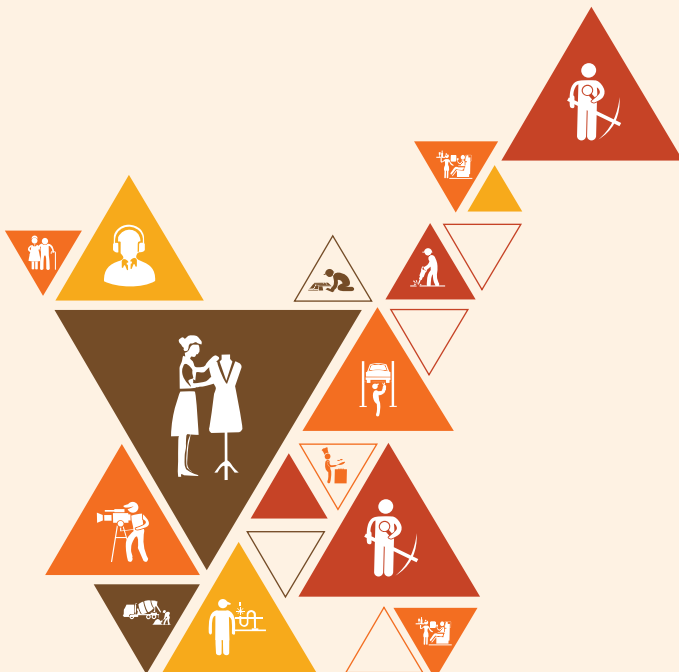
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2. Generic Mathematical Skills

Unit 2.1 - Basic Principles of Measurement, Geometry and Arithmetic Calculation



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Differentiate between the metric and inch systems of measurement, including their units and applications in various contexts.
2. Demonstrate the ability to perform basic arithmetic calculations using both metric and inch measurements, enabling accurate computations in construction scenarios.
3. Calculate the area, volume, and perimeter of basic geometric shapes, equipping participants with practical skills for geometry-related tasks in construction and related fields.

Unit 2.1 Basic principles of measurement, geometry and arithmetic calculation

Unit Objectives

After the end of this unit, participants will be able to:

1. Differentiate between the metric and inch systems of measurement, including their units and applications in various contexts.
2. Demonstrate the ability to perform basic arithmetic calculations using both metric and inch measurements, enabling accurate computations in construction scenarios.
3. Calculate the area, volume, and perimeter of basic geometric shapes, equipping participants with practical skills for geometry-related tasks in construction and related fields.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about units measurement and arithmetic calculations used in construction painting works.

Say

- In the previous session, we discussed roles and responsibilities of Construction painter and decorator. In this session, we shall learn about basic principles of measurement, geometry and arithmetic calculation relevant to painting work and paint estimation.

Ask

- How does geometry play a role in painting work and estimation?
- Can you provide an example of a geometric shape commonly encountered in painting projects?

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Elaborate

- Different System of Measurement
- Basic Mathematical Calculations
- Measurement of Paint Area and Paint Requirement

Activity -1

- **Topic:** Surface Area Calculation and Paint Estimation Simulation
- **Purpose:** To provide hands-on experience in calculating surface area and estimating paint requirements for various surfaces.
- **Resources:** Sample surface dimensions (walls, ceilings), paint coverage rates.
- **Tentative Duration:** 60 min
- **Procedure:**
 - ◆ Divide students into pairs.
 - ◆ Distribute cards with different surface dimensions (length and height) to each pair.
 - ◆ Instruct each pair to calculate the surface area of their given dimensions using the appropriate geometry formula.
 - ◆ Provide a range of paint coverage rates for different types of surfaces (e.g., smooth walls, textured walls).
 - ◆ Ask students to estimate the amount of paint required for their surfaces using the calculated area and selected paint coverage rate.
 - ◆ Have pairs compare their estimates and discuss any differences, highlighting the impact of coverage rate on paint estimation.
 - ◆ Conduct a class discussion to share findings and strategies used for estimation.
- **Expected Outcome:** Students will enhance their understanding of surface area calculations and how different factors affect paint estimation, preparing them for practical painting projects.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now? Let us do another activity.

Activity -1

- **Topic:** Unit Measurement Test: Construction Painting
- **Instructions:** Solve the following unit measurement problems related to construction painting using units commonly used in India. Show your work and write down your final answers with appropriate units.
 - a. **Surface Area Calculation:** You have a rectangular wall with a length of 4.5 meters and a height of 2.4 meters. Calculate the total surface area that needs to be painted.
 - b. **Paint Coverage Calculation:** A can of paint covers an area of 37.16 square meters. How many cans of paint will be needed to cover a wall that has an area of 111.48 square meters?
 - c. **Volume Calculation:** You're painting a cylindrical water tank with a diameter of 1.8 meters and a height of 3.05 meters. Calculate the volume of paint required to paint the entire tank. (Use $\pi = 3.14$)
 - d. **Dilution Calculation:** You need to dilute 7.5 liters of paint with a ratio of 1:4 (1 part paint to 4 parts thinner). How much thinner should you add?
 - e. **Cost Estimation:** The cost per liter of paint is ₹150. Estimate the total cost of paint required to paint four walls, each with an area of 30 square meters.
 - f. **Conversion Challenge:** Convert 5 feet to meters. (1 foot = 0.3048 meters)
 - g. **Gradient Calculation:** You're painting a sloped roof with a vertical rise of 1.5 meters and a horizontal run of 4.5 meters. Calculate the slope of the roof.
 - h. **Tape Length Calculation:** You're masking the edges of a door that is 0.9 meters high and 0.6 meters wide. Calculate the total length of tape needed to mask all four sides of the door.
 - i. **Temperature Conversion:** Convert 30 degrees Celsius to Fahrenheit using the formula: $F = (C \times 9/5) + 32$
 - j. **Weight Conversion:** Convert 75 kilograms to pounds. (1 kilogram = 2.20462 pounds)
- **Answers:**
 - ◆ 21.6 sqm
 - ◆ 3 cans
 - ◆ 16.561 cubic meters
 - ◆ 30 litres of thinner
 - ◆ ₹18,000
 - ◆ 1.524 meters
 - ◆ Slope = $1/3$
 - ◆ 3 meters
 - ◆ 86 °F
 - ◆ 165.3475 pounds

Say 

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do 

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Ask 

- Have you established quality standards for the painting work (e.g., even coverage, no drips)?
- How will you ensure that the painting work meets these standards?

Exercise



1.
 - a) Meter
2.
 - b) MKS System
3. 0.145
4. meters
5. 0.0568182
6. R9
7. d) 140m^2

Notes

Lined writing area containing 24 horizontal lines.



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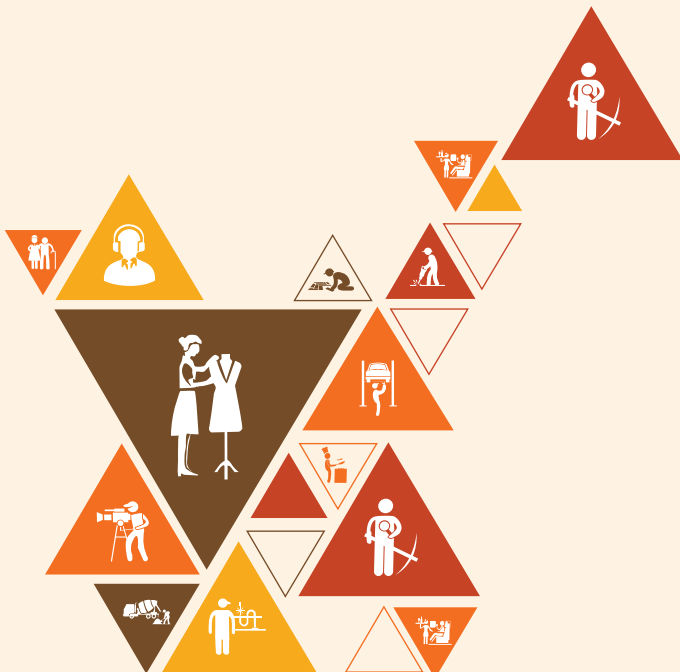
3. Making Wooden Shutters Used in Shuttering Carpentry

Unit 3.1 - Hand and Power Tools

Unit 3.2 - Measuring Instruments

Unit 3.3 - Handling and Maintenance of Tools

Unit 3.4 - Shutter Panel Materials –System



CON/N0302

Key Learning Outcomes

After the end of this module, participants will be able to:

1. Explain the use of different tools used for carpentry work.
2. Describe the sequence and standard practice of marking, laying out and cutting of form sheathing and stiffeners as per requirement for carpentry works.
3. Explain the handling and maintenance procedure of hand and power tools.
4. List the safety precautions followed while using power tools for the preparation of shutters/ frames.
5. Explain the various features of different types of timber used in shuttering works.
6. Demonstrate the visual checks to determine the quality of timber, plywood and other materials used for preparation of shutters.
7. Discuss about the seasoning of timber and common defects in timber.
8. Explain the methods to select quality materials and tools as per requirement in carpentry work.
9. Show how to Interpret sketches and working drawings used for shuttering work.
10. Show how to prepare cutting plan for the plywood/ timber as per the shape and size of the shuttering components.
11. Show how to measure and mark plywood and timber using measuring and marking tools.
12. Show how to measure and mark sheathing and stiffeners at sketched location.
13. Demonstrate the cutting of sheathing material within the tolerance limit using various hand and power tools as per instructions /specifications.
14. Explain the importance of using different types of joints such as dovetail joint, Tenon and mortise and lap joints.
15. Discuss the steps for the preparation of different types of joints used in wooden shutters.
16. Demonstrate making the wooden shutter panels using different types of joints such as dovetail, tenon and mortise, and lap joints as per specifications.
17. Show how to repair defects on the prepared shutters as per instructions.

Unit 3.1: Hand and Power Tools Used in Shuttering Carpentry Works

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain about various hand and Power tools Used for Shuttering Works
2. Show how to prepare cutting plan for the plywood/ timber as per the shape and size of the shuttering components.
3. Demonstrate the cutting of sheathing material within the tolerance limit using various hand and power tools as per instructions /specifications.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about tools, materials and accessories used in shuttering carpenter work.

Say

In the previous session, we discussed basic principles of measurement, geometry, and arithmetic calculation relevant to shuttering carpenter. In this session, we shall learn about different shuttering carpentry, hand, and power tools, preparing cutting plan and tolerance limit.

Ask

- How familiar are you with shuttering tools and materials?
- What do you hope to learn or gain from this session on hand and power tools and cutting?

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Elaborate

- Hand and Power Tools and Accessories Required For shuttering work
- Different cutting techniques
- Power tools uses and its working

Activity -1

- **Activity Name:** Hands-On Cutting Practice
- **Purpose:** To familiarize students with using handsaws for cutting plywood panels accurately and safely.
- **Resources:** Plywood panels, handsaws, safety equipment (goggles, gloves), marked shapes for cutting.
- **Tentative Duration:** 45 minutes
- **Procedure:**
 - ◆ Divide students into groups.
 - ◆ Provide each group with materials and safety gear.
 - ◆ Assign a specific shape to cut from the plywood.
 - ◆ Guide students through the steps of using handsaws for cutting.
 - ◆ Allow students to complete their cuts.
- **Group discussions:** Share experiences, challenges, and techniques used.
- **Expected Outcome:** Students will have hands-on experience using handsaws, understanding basic cutting techniques, and enhanced awareness of safety precautions.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Activity -2

- **Activity Name:** Chisel Techniques Workshop
- **Purpose:** To engage students in practical demonstrations of chisel cutting techniques and their applications.

- **Resources:** Various types of chisels, wooden planks, safety gear, workstations.
- **Tentative Duration:** 1 hour
- **Procedure:**
 - ◆ Set up workstations with different chisels and wooden planks.
 - ◆ Divide students into groups and rotate them through the stations.
 - ◆ Demonstrate and guide students through mosaic cut, paring cut, chopping cut, and scraping techniques.
 - ◆ Allow students to practice each technique at the respective station.
 - ◆ Encourage experimentation with angles and techniques.
- **Group discussion:** Share insights, challenges, and lessons learned.
- **Expected Outcome:** Students will gain hands-on experience in using various chisel cutting techniques, understanding their applications, and building confidence in working with chisels.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 3.2: Measuring Instruments Used by Shuttering Carpenter

Unit Objectives

After the end of this unit, participants will be able to:

1. Discuss about measuring instruments Used in Shuttering Carpentry works
2. Explain the methods to select quality materials and tools as per requirement in carpentry work.
3. Know about how to use measuring instruments.
4. Describe the sequence and standard practice of marking, laying out and cutting of form sheathing and stiffeners as per requirement for carpentry works.
5. 5. Show how to measure and mark plywood and timber using measuring and marking tools.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, poster/posters depicting various information about methods related to handling and storing painting tools and materials.

Say

In the previous session, we discussed different hand and power tools, cutting and sheathing keeping tolerance limit in mind. In this session, we will understand measuring instruments, selecting quality materials and tools, mastering precise measurement, and marking, and learning the sequence for form cutting. Practical guidance will be provided for measuring and marking plywood and timber.

Ask

- What are some common measuring tools and equipment?
- Have you ever wondered how precise measurements play a crucial role in carpentry projects?
- What factors guide the selection of the right materials and tools in carpentry?
- Have you ever wondered how carpenters follow a precise sequence for marking, laying out, and cutting components?

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Elaborate

- Storing various measuring instruments used in shuttering carpentry
- Method to select material and tools to be used for shuttering carpentry work
- Standard practice of marking, lying out and cutting of form sheathing and stiffeners
- Measuring and marking on timber using appropriate tools

Activity -1

- **Topic:** Understanding the Practical Application of Measuring Instruments in Carpentry
- **Purpose:** To provide learners with hands-on experience in using different measuring instruments and understand their specific roles in carpentry.
- **Resources:** Spirit levels, plumb bobs, steel rules, tape measures, engineer's squares, wooden boards, pencils, instructional materials.
- **Tentative Duration:** 60 minutes
- **Procedure:**
- **Introduction:** Begin by discussing the significance of accurate measurements in carpentry and introduce the measuring instruments mentioned in the content.
- **Group Formation:** Divide participants into small groups of 3-4 members each.
- **Station Setup:** Set up different stations representing each measuring instrument. Assign a station to each group.
- **Station Rotations:** Instruct groups to rotate through each station, spending about 5 minutes at each.
 - ◆ **Spirit Level Station:** At this station, participants will be provided with a spirit level and a marked surface. They will work together to check both vertical and horizontal accuracy

using the spirit level.

- ◆ **Plumb Bob Station:** Here, participants will use a plumb bob and string to check vertical accuracy. They will follow the steps mentioned in the content.
 - ◆ **Steel Rule Station:** Participants will be given a steel ruler and a wooden board. They will **practice measuring and marking specific dimensions using the ruler and pencil.**
 - ◆ **Tape Measure Station:** Participants will use a tape measure to measure different lengths and curves. They will explore the flexibility and convenience of the tape measure.
 - ◆ **Engineer's Square Station:** At this station, participants will use an engineer's square to check if shuttering panels form a 90-degree angle.
- **Discussion and Reflection:** After completing all rotations, gather the groups for a discussion. Each group can share their experiences, challenges faced, and insights gained from using the different measuring instruments.
 - **Group Presentation:** Ask each group to present a brief summary of their learnings and observations. Encourage them to discuss the practical applications of the measuring instruments.
 - **Expected Outcome:** Participants will actively engage in hands-on learning, gaining practical experience in using measuring instruments such as spirit levels, plumb bobs, steel rules, tape measures, and engineer's squares. They will understand the specific uses of these instruments in carpentry, enhancing their comprehension of the topic. Additionally, participants will reflect on the importance of accuracy in measurements for successful carpentry projects.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now? Let's us make another activity to learn about the marking and measurement.

Activity -2

- **Purpose:** To provide participants with practical experience in accurately measuring and marking wood materials, crucial for precise carpentry work.
- **Resources:** Wood folding rulers, measuring tapes, steel rulers, wooden boards, sharp pencils (2H), stop blocks, instructional materials.
- **Tentative Duration:** 45 minutes
- **Procedure:**
 - ◆ **Introduction:** Begin by emphasizing the importance of accurate measuring and marking in woodworking and introduce the steps mentioned in the content.
 - ◆ **Group Formation :** Divide participants into small groups of 3-4 members each.

- **Station Setup** : Set up different stations representing each step of accurate marking. Assign a station to each group.
- **Station Rotations** : Instruct groups to rotate through each station, spending about 5 minutes at each.
- **Ruler Selection & Marking Station:** Provide different measuring tools (wood folding ruler, measuring tape, steel ruler) and wooden boards. Participants will practice marking lines accurately using pencils while keeping the ruler and pencil at the same point.
- **Basic Measurement Station:** Provide wooden boards with marked dimensions. Participants will use a ruler to measure from one end, ensuring the ruler's markings meet the work surface. They will then mark the dimensions on the boards.
- **Middle Marking and Center Finding Station:** Provide boards with diagonal inch graduations. Participants will practice finding the center of the board by dividing it into equal spaces and marking between the numbers.
- **Discussion and Reflection:** After completing all rotations, gather the groups for a discussion. Each group can share their experiences, challenges faced, and insights gained from practicing accurate marking techniques.
- **Group Presentation:** Ask each group to present their observations and insights. Encourage them to discuss the importance of accurate marking in woodworking and how these techniques contribute to the quality of carpentry work.
- **Expected Outcome:** Participants will engage in hands-on learning, gaining practical experience in measuring and marking wood materials accurately. They will understand the significance of precise marking in woodworking and how it contributes to successful carpentry projects. Additionally, participants will reflect on the challenges and techniques involved in achieving accurate measurements and markings.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Notes



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Unit 3.3: Handling and Maintenance of Tools

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain the handling and maintenance procedure of hand and power tools.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information along with the hand and power tools, measuring tools, safety equipment used in shuttering carpenter work

Say

Today, we will delve into the important topic of handling and maintaining both hand and power tools.

Ask

- How do you think proper handling and maintenance of hand and power tools can impact the quality and efficiency of your carpentry work?
- Can you identify any specific challenges or issues that might arise if tools are not cleaned and maintained regularly?

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Elaborate

- Handling of hand and power tools and accessories, its cleaning and safe storage.

Activity -1



- **Activity Name:** Shuttering Carpentry Tools Handling and Maintenance Workshop
- **Purpose:** To educate participants on the proper handling and maintenance of shuttering carpentry tools, ensuring their longevity, safety, and optimal performance.
- **Resources:** Presentation materials (slides or printed handouts) detailing the content from 3.3.1 Shuttering Carpentry Tools, Shuttering carpentry tools for demonstration, Old towels or rags, Lubricants and oil, Sandpaper, Heavy gloves, Goggles, Wire brush, Power cords (damaged or simulated for demonstration), Tool storage boxes, Manufacturer’s manuals (if available)
- **Tentative Duration:** 60mn
- **Procedure:**
 - ◆ **Introduction**
 - ◆ Begin by introducing the importance of proper tool handling and maintenance in the carpentry profession.
 - ◆ Provide a brief overview of the content to be covered: “Shuttering Carpentry Tools Handling and Maintenance.”
 - ◆ Presentation and Discussion
 - ◆ Present the content from section 3.3.1, using slides or printed handouts.
 - ◆ Encourage participants to ask questions and participate in discussions about each point as it’s presented.
 - ◆ Emphasize the significance of each point and its impact on tool longevity, safety, and performance.
 - Demonstration Stations
 - ◆ **Set up different stations for hands-on demonstrations:**
 - **Cleaning Station:** Participants practice cleaning tools using old towels or rags to remove dust, grease, and debris.
 - **Maintenance Station:** Participants examine tools for signs of corrosion or rust, and apply oil and lubricants to adjustable parts.
 - **Handle Maintenance Station:** Participants use sandpaper to sand handles smoothly and learn how to apply linseed oil for protection.
 - **Power Tool Inspection Station:** Participants inspect power tools for wear or damage, paying special attention to cords and prongs.
 - **Lubrication Station:** Participants learn how to lubricate power tools properly for optimal performance.

- ◆ **Safety Measures Workshop**
 - Conduct a safety workshop focused on the safe handling of tools:
 - Explain the importance of wearing heavy gloves and goggles during maintenance tasks.
 - Demonstrate how to safely use a wire brush to remove rust.
 - Emphasize the significance of inspecting power cords and prongs to prevent electrical hazards.
- ◆ **Group Discussion and Q&A**
 - Gather participants to discuss what they've learned from the hands-on activities.
 - Address any questions or concerns participants might have regarding tool handling and maintenance.
- ◆ **Conclusion**
 - Summarize the key points covered during the workshop.
 - Highlight the importance of regular maintenance for both hand and power tools in ensuring their longevity and safe operation.
- ◆ **Distribution of Handouts and Resources**
 - Provide participants with printed handouts summarizing the main points covered in the workshop.
 - Share any additional resources or manufacturer's manuals for reference.
- **Expected Outcome:** Participants will understand the significance of maintaining shuttering carpentry tools for longevity, safety, and performance. They will learn to clean tools, recognize corrosion, apply lubrication, maintain handles, inspect power tools, practice safety measures, store tools properly, and consult manufacturer's manuals. Through hands-on activities and discussions, participants will be empowered to handle and maintain tools effectively, contributing to their expertise and work efficiency.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 3.4: Shutter Panel-Materials

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain the various features of different types of timber used in shuttering works.
2. Demonstrate the visual checks to determine the quality of timber, plywood and other materials used for preparation of shutters.
3. Discuss about the seasoning of timber and common defects in timber.
4. Show how to repair defects on the prepared shutters as per instructions.
5. Understand the seasoning techniques used for timber
6. Understand cutting of wood using power tools
7. Understanding of various types of plywood used in shuttering works.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information along with the hand and power tools, measuring tools, safety equipment used in shuttering carpenter work.

Say

Today, we will delve into the important topic of features of different types of timber and plywood used in shuttering works, perform visual quality checks on materials, discuss seasoning techniques, identify common timber defects, repair defects on prepared shutters, demonstrate proper wood cutting using power tools, and recognize various types of plywood applicable in shuttering activities.

Ask

- “Can you describe some key characteristics that differentiate various types of timber used in shuttering works and how these characteristics affect their suitability for different construction projects?”
- “What visual cues or indicators would you look for when assessing the quality of timber, plywood, and other materials intended for shutter preparation, and how do these indicators relate to the materials’ overall suitability?”

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Elaborate

- Understand timber types and their qualities for shuttering, assessing density, grain, moisture, and durability, impacting construction choices.
- Learn to visually inspect materials like timber and plywood for structural integrity and defects, ensuring quality in shutter preparation.
- Explore timber seasoning techniques, identify common defects, and gain skills to repair shutter imperfections following best practices.

Activity -1

- **Activity Name:** Exploring Timber Classification and Applications
- **Purpose:** To help learners understand the classification and applications of timber in construction by examining various types of wood, their characteristics, and uses.
- **Resources:** Presentation materials (slides or printed handouts) detailing the content from 3.4.1, Samples or images of hardwoods (e.g., mahogany, teak, sheesham) and softwoods (e.g., cedar, pine, fir), Marker board and markers
- **Tentative Duration:** 60mn
- **Procedure:**
 - ◆ **Introduction**
 - Introduce the importance of timber in construction and carpentry works.
 - State the objective of the activity: understanding the classification and applications of different types of timber.
 - ◆ **Presentation and Discussion**
 - Present the content from section 3.4.1 Timber using slides or handouts.
 - Discuss the classification of timber into hardwoods and softwoods, and provide examples of each.

- Highlight the distinctive characteristics, uses, and applications of specific hardwoods and softwoods.
- **Procedure:**
 - ◆ **Timber Samples Exploration**
 - Display or provide images of hardwoods (mahogany, teak, sheesham) and softwoods (cedar, pine, fir).
 - Divide learners into small groups and assign each group a type of timber to focus on.
 - Have each group examine the samples/images and discuss the texture, color, grain, and potential construction applications of their assigned timber.
- **Group Presentations**
 - Invite each group to present their findings to the rest of the class.
 - Encourage discussions on the unique properties and applications of each type of timber.
 - Facilitate a brief Q&A session after each presentation.
- **Wrap-up and Reflection**
 - Summarize the key points covered during the activity.
 - Ask learners to reflect on how understanding the characteristics of different timber types can influence their choices in construction projects.
- **Expected Outcome:** Participants will understand the significance of maintaining shuttering carpentry tools for longevity, safety, and performance. They will learn to clean tools, recognize corrosion, apply lubrication, maintain handles, inspect power tools, practice safety measures, store tools properly, and consult manufacturer's manuals. Through hands-on activities and discussions, participants will be empowered to handle and maintain tools effectively, contributing to their expertise and work efficiency.

Activity -2



- **Topic:** Understanding Different Defects in Timber and Their Causes
- **Purpose:** To familiarize learners with various defects observed in timber and the underlying causes, enhancing their knowledge of timber quality assessment.
- **Resource:** Presentation materials (slides or printed handouts) covering the content from section 3.4.1.1 Defects In Timber, images of defects (chip mark, diagonal grain, torn grain, wane, etc.)
- **Tentative Duration:** 45 minutes
- **Procedure:**

- ◆ **Introduction**
 - Introduce the topic of timber defects and explain its importance in construction and carpentry works.
 - Presentation and Discussion
 - Present the different categories of defects in timber: defects due to conversion, fungi, insects, natural forces, and seasoning.
 - Display images of defects (chip mark, diagonal grain, torn grain, etc.) as visual aids.
 - Briefly explain the causes and implications of each type of defect.
- ◆ **Defect Identification**
 - Divide learners into small groups.
 - Provide images of different defects and ask each group to identify and discuss the specific defect shown in the image.
- ◆ **Group Presentations**
 - Each group presents their identified defect, its cause, and its potential impact on the quality and durability of timber.
- ◆ **Discussion and Q & A**
 - Facilitate a short discussion on the learners' findings and encourage questions regarding the causes and prevention of timber defects.
- ◆ **Reflection**
 - Lead a brief reflection on the activity, asking learners to consider how understanding these defects could influence their timber selection and construction decisions.
- **Expected Outcome:** By the end of the activity, participants will be able to:
 - Identify different defects in timber such as chip marks, diagonal grain, torn grain, wane, and others.
 - Understand the causes and implications of defects due to conversion, fungi, insects, natural forces, and seasoning.
 - Recognize the importance of quality assessment and preventive measures to ensure the integrity of timber used in construction.

Say



Did you find this activity interesting? Can you see how much information you had previously and how much information you have now? Lets do another activity to understand about plywood and its types to use in shuttering.

Activity -3



- **Activity Name:** Exploring Plywood Types and Applications
- **Topic:** Understanding Plywood Types, Grades, and Applications in Construction
- **Purpose:** To acquaint learners with different types of plywood, their grades, standard sizes, and advantages in construction applications.
- **Resource:** Presentation materials (slides or printed handouts) covering the content from section 3.4.2 Plywood, images of various types of plywood, sizes and grades table.
- **Tentative Duration:** 45 minutes
- Procedure:
 - ◆ **Introduction**
 - Introduce the topic of plywood's importance in construction, focusing on its various types, grades, and applications.
 - ◆ **Presentation and Discussion**
 - Present the content from section 3.4.2 Plywood using slides or handouts.
 - Discuss the basic structure of plywood, its composition, and the process of manufacturing.
 - Highlight the advantages of plywood as a formwork material for construction.
 - ◆ **Types of Plywood Exploration**
 - Display images of MR grade plywood, BWR grade plywood, and Marine grade plywood.
 - Explain the differences between these types in terms of their waterproof properties and intended applications.
 - ◆ **Group Activity - Matching Game**
 - Prepare cards with plywood types (MR grade, BWR grade, Marine grade) on one side and their corresponding advantages on the other side.
 - Divide learners into small groups and distribute the cards.
 - Have the groups match the correct type of plywood with its associated advantages.
 - ◆ **Discussion and Q&A**
 - Discuss the matched pairs from the game, emphasizing the practical benefits of each type of plywood in construction.
 - ◆ **Reflection**
 - Conclude by asking learners to reflect on how understanding the types and advantages of plywood can influence their construction decisions.

- **Expected Outcome:** By the end of the activity, participants will be able to:
 - Identify different types of plywood such as MR grade, BWR grade, and Marine grade.
 - Understand the advantages and suitability of each type for specific construction applications.
 - Recognize the significance of using appropriate plywood in construction to enhance efficiency and cost-effectiveness.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 3.5: Making of Wooden Shutter

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain the importance of using different types of joints such as dovetail joint, Tenon and mortise and lap joints.
2. Discuss the steps for the preparation of different types of joints used in wooden shutters.
3. Demonstrate making the wooden shutter panels using different types of joints such as dovetail, tenon and mortise, and lap joints as per specifications.
4. Show how to measure and mark plywood and timber using measuring and marking tools.
5. Show how to measure and mark sheathing and stiffeners at sketched location.
6. List the safety precautions followed while using power tools for the preparation of shutters/ frames.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information along with the hand and power tools, measuring tools, safety equipment used in shuttering carpenter work.

Say

Today, we will delve into Understanding the significance of diverse woodworking joints like dovetail, tenon and mortise, and lap joints which is crucial for crafting robust structures. This unite covers the steps for joint preparation, practical demonstrations, precise measuring, marking techniques, and essential safety measures when using power tools in shutter/frame making.

Ask

- Why is it important to choose the appropriate type of joint, such as dovetail, tenon and mortise, or lap joint, based on the intended purpose of the wooden shutter?
- How do you ensure accurate measurements and markings on both plywood and timber when crafting wooden shutters?
- What are some important safety precautions that need to be followed while utilizing power tools for shutter or frame preparation?

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the Unit.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the unit.

Elaborate

- Significance of selecting appropriate joints like dovetail, tenon and mortise, and lap joints for structural integrity.
- Steps for Joint Preparation
- Practical demonstrations of assembling wooden shutter panels using different joint types.
- Measuring and Marking Techniques.
- Sheathing and Stiffener Location.
- Safety Precautions with Power Tools.

Activity -1

- **Topic:** Wood Joints in Shuttering Carpentry
- **Purpose:** To provide participants with hands-on experience and knowledge of common wood joints used in shuttering carpentry, and to guide them through the process of making shutter panels using the discussed joints.
- **Resource:** Presentation materials (slides or printed handouts) covering the content from section 3.5, images of dovetail, lap, and mortise and tenon joints, formwork drawing of a column shutter mold, plywood sheets, measuring tools, steel rule, pencils, wooden battens, nails, circular saw (or alternative tools), hammer.
- **Tentative Duration:** 90 minutes
- **Procedure:**
 - ◆ Introduction
 - Introduce the concept of wood joints and their importance in carpentry, specifically in shuttering work.
 - Highlight the three types of joints to be covered: Dovetail, Lap, and Mortise and Tenon joints.

- ◆ **Presentation and Discussion**
 - Present the content on Dovetail, Lap, and Mortise and Tenon joints, using images and explanations.
 - Discuss their characteristics, strengths, and typical applications.
- ◆ **Joint Hands-On Exploration**
 - Divide participants into groups, assigning each group one type of joint to create using provided materials.
 - Participants work together to assemble a small jointed wooden structure using the assigned joint.
- ◆ **Shutter Panel Making Demonstration**
 - Display the formwork drawing of a column shutter mold.
 - Explain the steps involved in making shutter panels for the column mold.
 - Emphasize the importance of accurate measuring, marking, and proper selection of plywood.
- ◆ **Panel Making Practical Activity**
 - Provide participants with plywood sheets, measuring tools, pencils, steel rule, circular saw (or alternative tools), wooden battens, and nails.
 - Instruct participants to follow the demonstrated steps to measure, mark, and cut plywood to create the L-shaped shutter panels.
- ◆ **Sharing and Discussion**
 - Participants share their created jointed wooden structures and L-shaped shutter panels.
 - Facilitate a discussion on challenges faced, lessons learned, and insights gained during the hands-on activities.
- **Expected Outcome:**

By the end of the activity, participants will be able to:

 - Identify and differentiate between dovetail, lap, and mortise and tenon joints.
 - Understand the process of making shutter panels for column molds.
 - Demonstrate the ability to accurately measure, mark, and cut plywood for constructing L-shaped shutter panels.
 - Discuss the importance of selecting appropriate joints and materials for carpentry tasks.

Say 

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do 

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

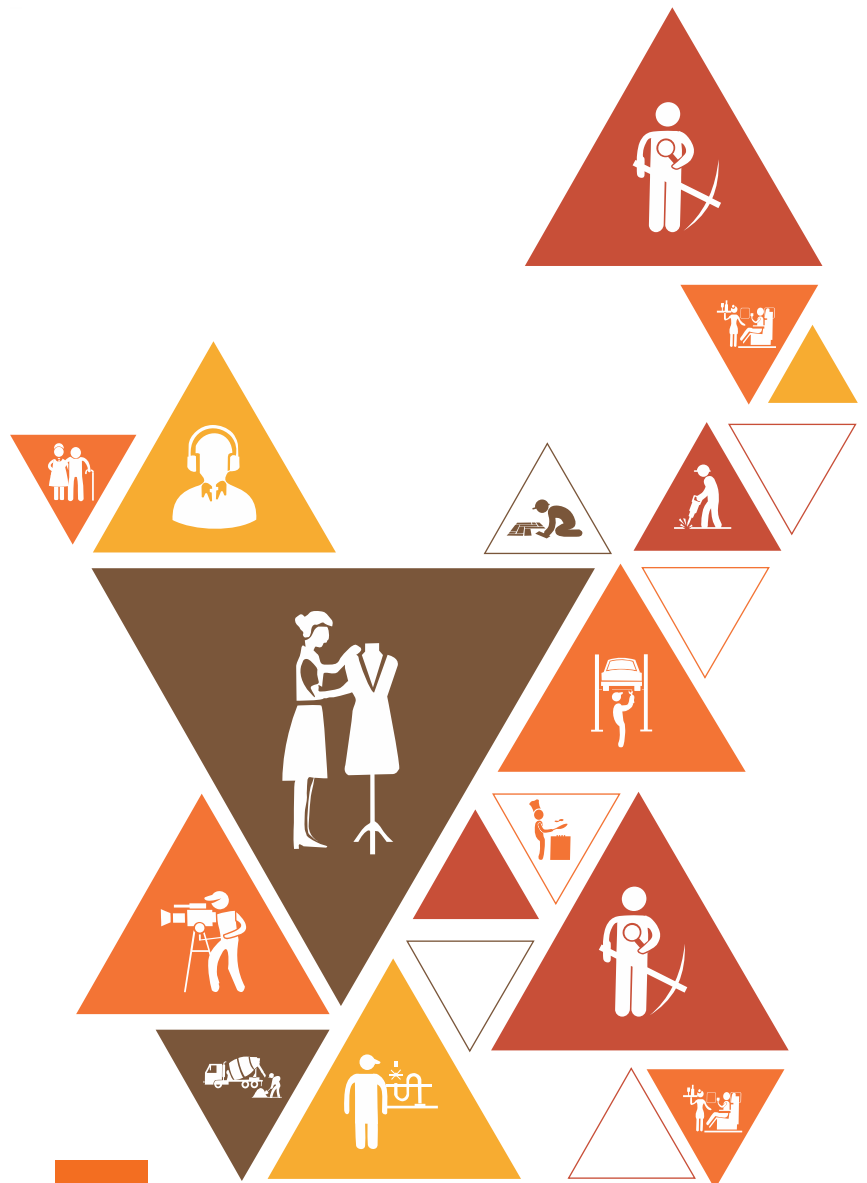
Notes for facilitation 

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Exercise

Key Solutions to PHB Exercise

1. B. cut the shuttering materials
2. B. Hammer
3. D. High carbon steel
4. A. tang
5. A. Firmer chisel
6. D. Divider
7. B. 1/16 inch
8. C. straight edge
9. C. Shrink or contraction rule
10. Storing tools properly is important to maintain their condition, prevent damage, and ensure their longevity. Proper storage also enhances safety by reducing the risk of accidents and injuries caused by mishandling or improper storage.
11. Common hand tools used in shuttering activities include: Handsaw, Chisels, Hammer, Measuring tape, Steel rule, Square (try square, bevel square, etc.), Marking tools (pencils, markers, e, Dividers, Clamps, Screwdrivers, Mallet, Straight edge, Spirit level
12. B. Tenon saw
13. B. Ply board
14. A. Portable electric circular hand saw
15. D. middle layer
16. A. It will shrink and warp easily
17. B. Batten
18. C. Always hit the tool squarely on top of the handle
19. A. Always sand against the grain
20. B. Warp
21. B. Lift the plane off the board on the return stroke
22. C. Smoothing plane
23. C. 39-42
24. C. Pattern maker





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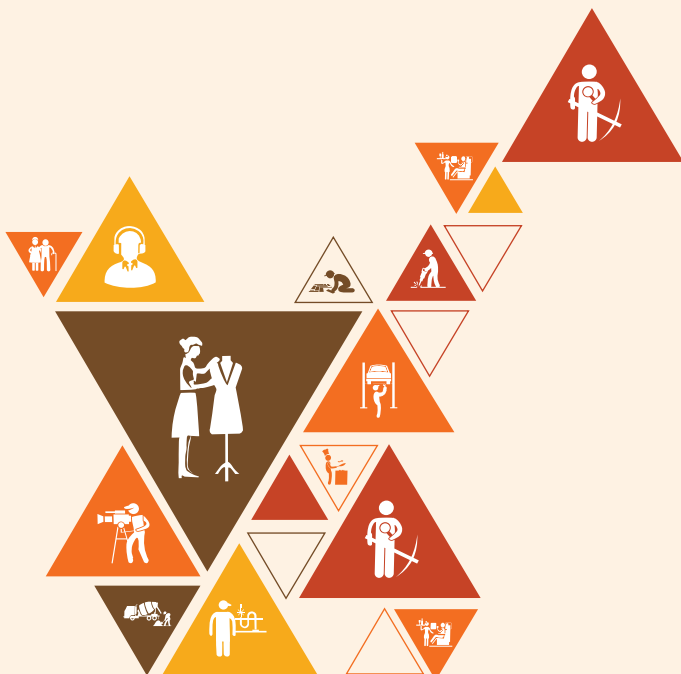
Transforming the skill landscape



4. Quality Checks on Shuttering Work

Unit 4.1 - Carry out Quality Check For Shuttering Works

Unit 4.2 - Checks on Footing, Column, Wall, Beams and Slab Formwork



CON/N0304

Key Learning Outcomes

After the end of this module, participants will be able to:

1. Explain different types of system formwork/ conventional formwork.
2. Describe the different types of material and components used in system formwork/ conventional formwork with specification
3. Explain the various checks for plumb, level and alignment of the formwork.
4. Describe the importance of Indian Standard / International codes and maximum tolerance limits for key quality checks of shuttering works.
5. Discuss the sequence followed for quality checks in shuttering works.
6. State the do's and don'ts required during rectification of shuttering works.
7. Explain the basics and fundamentals of reinforcement work, shuttering work and concreting works.
8. Discuss the application of release agent on shuttering panels.
9. Explain the process of obtaining approval for the assembled formwork.
10. Show how to interpret of the rough sketches / schematic working drawings/ cutting plans used in shuttering carpentry work.
11. Demonstrate the scope for covers to the reinforcement steel in shuttering works as per the given sketches.
12. Show how to check for the location, dimensions, rigidity of joints of plywood and timber.
13. Show how to check for verticality, position and spacing of props as per the load bearing capacity and support.
14. Demonstrate the corrective measure to be taken if twist is observed in alignment of the formwork.
15. Demonstrate the rectification measures of formwork boards / plates after their removal.
16. Perform checks to ensure the line, level and alignment of the shuttering woks with in tolerance limit and according to sketches / instructions.
17. Demonstrate the use of different type of support for formwork to ensure its stability.
18. Demonstrate procedure of obtaining approval for the assembled formwork.

Unit 4.1: Carry Out Quality Check for Shuttering Works

Unit Objectives

After the end of this unit, participants will be able to:

1. Describe the different types of material and components used in system formwork/ conventional formwork with specification
2. Explain the various checks for plumb, level and alignment of the formwork.
3. Describe the importance of Indian Standard / International codes and maximum tolerance limits for key quality checks of shuttering works.
4. Discuss the sequence followed for quality checks in shuttering works.
5. Show how to interpret of the rough sketches / schematic working drawings/ cutting plans used in shuttering carpentry work.
6. Demonstrate the scope for covers to the reinforcement steel in shuttering works as per the given sketches.
7. Show how to check for the location, dimensions, rigidity of joints of plywood and timber.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about the process and practices involved with quality check for shuttering work

Say

In the previous session, we practice about shuttering panels. In this session, we shall learn about carrying quality checks for shuttering works.

Ask

- Can you elaborate on the different types of materials and components used in both system formwork and conventional formwork, specifying their unique characteristics?
- How would you go about conducting checks for plumb, level, and alignment in formwork? Could you explain the methods you would employ?
- How would you go about checking the location, dimensions, and joint rigidity of plywood and timber? What tools and techniques would you use to ensure their accuracy and reliability?

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Elaborate

- Describe material & components in formwork.
- Explain plumb, level, alignment checks.
- Emphasize codes, tolerance for quality.
- Discuss sequence in quality checks.
- Interpret sketches, plans.
- Demonstrate reinforcement cover.
- Show plywood, timber joint checks.

Activity -1

- **Topic:** Quality Checks and Standards in Formwork for Construction
- **Purpose:** This activity aims to help learners understand the importance of quality checks and adherence to standards in formwork for construction projects. By exploring different types of materials, components, and techniques used in both system formwork and conventional formwork, learners will gain insights into ensuring accurate construction of forms.
- **Resource:** Presentation materials, formwork samples, specifications, IS codes.
- **Tentative Duration:** 45 minutes
- **Procedure:**
 - ◆ **Introduction**
 - Start by explaining the significance of formwork in construction and how it shapes and supports concrete until it gains strength. Highlight the two main types of formwork: system formwork and conventional formwork.
 - ◆ **Types of Materials and Components:**
 - Describe the various materials and components used in system formwork and conventional formwork, such as aluminum, steel, plastic, timber, plywood, lumber,

fasteners, and accessories. Use samples and images to illustrate each type.

- ◆ **Checks for Plumb, Level, and Alignment:**
 - Explain the checks needed to ensure the plumb, level, and alignment of formwork components. Emphasize the importance of these checks to maintain structural integrity.
- ◆ **Importance of Standards:** Discuss the significance of Indian Standard (IS) codes and international standards in formwork construction. Explain how these standards provide guidelines for maximum tolerance limits and quality checks.
- ◆ **Sequence of Quality Checks:** Outline the sequence to follow for quality checks in formwork. Discuss the stages where checks are performed, such as ground level and above ground level.
- ◆ **Interpreting Sketches and Plans:** Show how to interpret rough sketches, schematic working drawings, and cutting plans used in shuttering carpentry work. Explain how accuracy in interpretation impacts the construction process.
- ◆ **Demonstrating Reinforcement Cover:** Demonstrate the scope for covers to the reinforcement steel in shuttering works as per the provided sketches. Highlight the importance of maintaining proper cover for durability and strength.
- ◆ **Checking Plywood and Timber Joints:** Show how to check for the location, dimensions, and rigidity of joints in plywood and timber. Explain how well-fitted joints contribute to stability.
- ◆ **Discussion and Q&A :** Encourage learners to ask questions and clarify doubts related to formwork materials, components, quality checks, and standards.
- **Expected Outcome:** Learners will gain a comprehensive understanding of the materials, components, checks, and standards associated with system formwork and conventional formwork. They will appreciate the importance of adhering to quality checks and standards to ensure safe and successful construction projects.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 4.2: Checks on Reinforcement Work, Shuttering Work and Concreting Works Unit Objectives

Unit Objectives

1. State the do's and don'ts required during rectification of shuttering works.
2. Explain the basics and fundamentals of reinforcement work, shuttering work, and concreting works.
3. Discuss the application of release agent on shuttering panels.
4. Explain the process of obtaining approval for the assembled formwork.
5. Show how to check for verticality, position and spacing of props as per the load bearing capacity and support.
6. Demonstrate the corrective measure to be taken if twist is observed in alignment of the formwork.
7. Demonstrate the rectification measures of formwork boards / plates after their removal.
8. Perform checks to ensure the line, level and alignment of the shuttering works within tolerance limit and according to sketches / instructions.
9. Demonstrate the use of different type of support for formwork to ensure its stability.
10. Demonstrate procedure of obtaining approval for the assembled formwork.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about the process and practices involved with quality check for shuttering work

Say

In the previous session, we practice about carrying quality checks for shuttering works.. In this session, we shall learn about reinforcement work, shuttering work and concreting works.

Ask

- When rectifying shuttering works, what are some key do's and don'ts that need to be followed to ensure the quality of the construction process?
- How do the basics and fundamentals of reinforcement work, shuttering work, and concreting work interconnect to create a structurally sound concrete structure? Can you provide specific examples of how each aspect influences the others?

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the unit.
- Make the session interactive by asking the participants to share their expectations from the unit on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the unit.

Elaborate

- Do's and Don'ts during Rectification of Shuttering Works
- Basics and Fundamentals of Reinforcement, Shuttering, and Concreting
- Application of Release Agent on Shuttering Panel
- Process of Obtaining Approval for Assembled Formwork
- Checking Verticality, Position, and Spacing of Props
- Corrective Measures for Twist in Formwork Alignment
- Rectification Measures for Formwork Boards/Plates After Removal
- Checks for Line, Level, and Alignment of Shuttering Works
- Demonstration of Different Types of Formwork Supports
- Procedure for Obtaining Approval for Assembled Formwork

Activity -1

- **Topic:** Formwork Material Matching Game
- **Purpose:** To reinforce the understanding of different types of materials used in formwork construction.
- **Resource:** Cards with names of formwork materials (e.g., Plywood, Steel, Aluminum, Plastic, Timber, Lumber), small containers or envelopes.
- **Tentative Duration:** 20-30 minutes
- **Procedure:**
 - ◆ **Preparation:**
 - Prepare cards with the names of different formwork materials and place them in small containers or envelopes.

◆ Introduction

- Briefly discuss the importance of using the right formwork materials for different construction projects. Explain that in this activity, participants will match the correct material to its description.

◆ Activity Instructions:

- Distribute the containers or envelopes containing the formwork material cards to participants.

◆ Matching Game:

- Instruct participants to read the description of a particular formwork scenario (e.g., “You need a lightweight and reusable material for large-scale projects”).
- Participants must then match the description with the correct formwork material card from their container/envelope.
- Encourage participants to discuss and collaborate within their groups to make the correct matches.

◆ Group Discussion

- After completing the matching game, facilitate a group discussion where participants explain their choices and reasoning for matching each description with a specific formwork material.
- Expected Outcome: Participants will reinforce their understanding of different formwork materials and their appropriate applications. The activity encourages teamwork, critical thinking, and application of knowledge.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Activity -2

- **Topic:** Formwork Inspection and Correction Workshop
- **Purpose:** To practically demonstrate the process of inspecting and correcting formwork for different structural elements.
- **Resources required:** Model formwork setups for footings, columns, beams, and slabs; measuring tools (tape measure, plumb bob); checklist for quality checks; markers for highlighting issues.

- **Duration:** 60 minutes
- **Procedure:**
 - ◆ **Introduction:**
 - Explain the importance of quality checks and corrections in formwork construction to ensure stability, accuracy, and safety.
 - ◆ **Formwork Setup Display:**
 - Display model formwork setups for different structural elements (footings, columns, beams, slabs).
 - Briefly explain the components of each setup.
 - ◆ **Group Activity - Inspection and Correction:**
 - Divide participants into small groups and assign each group a specific formwork setup.
 - Provide each group with a checklist for quality checks and correction.
 - Instruct them to perform the quality checks based on the provided checklist for their assigned formwork setup.
 - If any issues are identified, participants must mark the areas of concern with markers.
 - ◆ **Group Presentations :**
 - Each group presents their findings, highlighting the issues they identified and the corrective measures they would take.
 - ◆ **Discussion and Recap:**
 - Engage in a class discussion about the challenges and lessons learned during the activity.
 - Emphasize the importance of attention to detail in formwork construction and the significance of making corrections.
- **Expected Outcome:** Participants will gain hands-on experience in inspecting and identifying issues in formwork setups for various structural elements. The activity promotes practical learning, problem-solving skills, and teamwork.

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class

Exercise

Key Solutions to PHB Exercise

1. Multiple Choice Questions

- i. b) To support concrete until it gains strength
- ii. c) System formwork
- iii. b) Steel
- iv. a. Spirit Level
- v. b. Measuring Tape
- vi. c. triangle
- vii. a. Cover Blocks

2. True or False Statements:

- i. True
- ii. False
- iii. True
- iv. False
- v. True

3. Fill in the Blanks:

- i. System
- ii. handling



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Transforming the skill landscape

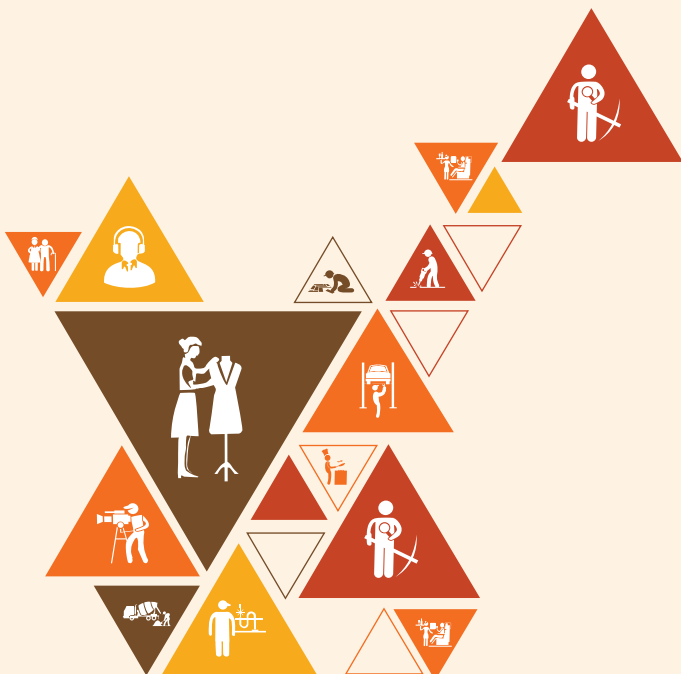


5. Teamwork and Effective Communication at Workplace

Unit 5.1 - Effective Communication and Teamwork

Unit 5.2 - Working Effectively and Maintaining Discipline at Work

Unit 5.3 - Maintaining Social Diversity at Work



CON/N8001

Key Learning Outcomes

After the end of this module, participants will be able to:

1. Elucidate own roles and responsibilities.
2. Explain the importance of effective communication.
3. Elucidate the consequence of poor teamwork on project outcomes, timelines, safety at the construction site, etc.
4. Demonstrate how to pass on work related information/ requirement clearly to the team members.
5. Explain different modes of communication used at workplace.
6. Explain the importance of creating healthy and cooperative work environment among the gangs of workers.
7. Show how to report any unresolved problem to the supervisor immediately.
8. Elucidate applicable techniques of work, properties of materials used, tools and tackles used, safety standards that co-workers might need as per the requirement.
9. Demonstrate ways to hand over the required material, tools, tackles, equipment and work fronts timely to interfacing teams.
10. Explain the importance of proper and effective communication and the expected adverse effects in case of failure relating to quality, timeliness, safety, risks at the construction project site.
11. Explain the importance and need of supporting co-workers facing problems for the smooth functioning of work.
12. Demonstrate ways to work together with co-workers in a synchronized manner.
13. Discuss the fundamental concept of gender equality.
14. Explain how to recognise and be sensitive to issues of disability, culture and gender.
15. Discuss legislation, policies, and procedures relating to gender sensitivity and cultural diversity including their impact on the area of operation.
16. Demonstrate effective implementation of gender neutral practices at workplace.
17. Demonstrate ways to address discriminatory and offensive behaviour in a professional manner as per organizational policy.

Unit 5.1: Effective Communication and Teamwork

Unit Objectives

After the end of this unit, participants will be able to:

1. Elucidate own roles and responsibilities.
2. Explain the importance of effective communication.
3. Explain different modes of communication used at the workplace.
4. Elucidate the consequence of poor teamwork on project outcomes, timelines, safety at the construction site, etc.
5. Demonstrate how to pass on work-related information/requirements clearly to the team members.
6. Show how to report any unresolved problem to the supervisor immediately.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters depicting effective interaction and communication at the workplace.

Say

In this session, we shall learn about the importance of the effect and benefit of timely actions, the importance of teamwork and its effects, proper and effective communication and its adverse effects, effective communication skills while interacting with various stakeholders, etc.

Demonstrate

Use a projector and show the following link- <https://www.youtube.com/watch?v=sEzTXTRo9L4> to participants on how to build effective communication skills.

Ask

- Does anyone know the Cs of effective communication?
- Why do you think it is important for a construction painter and decorator to learn about effective communication?

Elaborate

In this unit, we will discuss the following topics:

- Effective communication
- Teamwork
- Interpersonal Conflicts

Activity (Roleplay)

- **Purpose:** The purpose of this activity is to help students understand and practice effective communication skills.
- **Resources Required:** Whiteboard, markers, printed scenarios, timer, and notebooks.
- **Tentative Duration:** 60 minutes
- **Procedure:**
 1. Introduce the importance of communication.
 2. Provide communication scenarios to small 4-5 groups.

Scenario 1: Safety Briefing for New Workers

You are the site supervisor on a construction project, and several new workers have joined the team. The challenge is to conduct a safety briefing for the new workers, ensuring they understand the potential hazards on the site, safety protocols, and the proper use of personal protective equipment (PPE).

Scenario 2: Communicating Changes in the Construction Plan

During a construction project, unexpected challenges arise, leading to changes in the initial plan. As the project manager, you need to communicate these changes to the entire construction team effectively, addressing their concerns and ensuring everyone is on the same page to avoid delays and confusion.

3. Groups discuss and come up with solutions.
4. Groups perform role-plays of scenarios.
5. Provide feedback after each role-play.

Note: Trainer can introduce more similar scenarios

- **Expected outcome:** By the end of this practical activity, students are expected to achieve the following:

1. Improved understanding of effective communication.
2. Application of knowledge in real-life scenarios.
3. Ability to adapt communication style.
4. Enhanced collaboration and teamwork.
5. Increased confidence in communication skills.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic.
- Arrange audio-visual aids to make them understand effective communication at the workplace-
<https://youtu.be/V1RQG1nB4Kg>
- Ask the participants if they have any questions.

Unit 5.2: Working Effectively and Maintaining Discipline at Work

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain the importance of creating healthy and cooperative work environment among the gangs of workers.
2. Elucidate applicable techniques of work, properties of materials used, tools and tackles used, safety standards that co-workers might need as per the requirement.
3. Explain the importance of proper and effective communication and the expected adverse effects in case of failure relating to quality, timeliness, safety, risks at the construction project site.
4. Explain the importance and need of supporting co-workers facing problems for the smooth functioning of work.
5. Demonstrate ways to hand over the required material, tools, tackles, equipment and work fronts timely to interfacing teams.
6. Demonstrate ways to work together with co-workers in a synchronized manner.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters depicting effective interaction and communication at the workplace.

Say

In this session, we shall learn about working effectively and maintaining discipline at work.

Ask

- Why is creating a healthy and cooperative work environment important within gangs of workers on a construction site?
- Why is adhering to safety standards crucial for co-workers in a construction project? What are the potential consequences of neglecting safety?
- Can you share a personal experience or example where effective teamwork and cooperation led to the successful completion of a construction task?

Elaborate

- Importance of Healthy Work Environment
- Techniques, Materials, Tools, Safety
- Effective Communication and Impact
- Supporting Co-Workers
- Timely Handover to Interfacing Teams
- Synchronized Work Approach

Activity -1

- **Topic:** Co-Worker Support Relay
- **Purpose:** This activity is designed to promote teamwork and the importance of supporting co-workers facing challenges in a construction environment.
- **Resources:**
 - ◆ Cones or markers.
 - ◆ Blindfolds (optional).
 - ◆ Various construction-related objects (tools, materials, etc.).
- **Tentative Duration:** 30-45 minutes
- **Procedure:**
 - ◆ **Preparation:**
 - Set up a course area with cones or markers to create a clear path.
 - Place different construction-related objects along the path.
 - ◆ **Introduction:**
 - Briefly discuss the significance of supporting co-workers in a construction team and how it contributes to smoother operations.
 - ◆ **Divide into Teams:**
 - Divide participants into teams of equal size.
 - ◆ **Explanation of the Relay:**
 - Explain the relay race concept: Each team member will take turns being blindfolded (if using blindfolds) and guided by their teammates through the course to collect specific objects.

- ◆ **Teammate Support:**
 - One team member wears a blindfold (if using blindfolds).
 - Other team members guide the blindfolded teammate using verbal instructions.
 - The objective is to navigate the course and collect designated objects.
- ◆ **Rotating Roles:**
 - After completing the course, rotate roles within the team, so each participant gets a chance to be blindfolded and guided.
- ◆ **Debrief and Discussion:**
 - Gather participants and discuss the experience.
- ◆ **Ask questions like:**
 - How did you feel while blindfolded and relying on your team's guidance?
 - How important was effective communication during the activity?
 - How does this activity relate to supporting co-workers in a construction setting?
- ◆ **Learning Points:**
 - Emphasize the value of clear communication, trust, and teamwork.
 - Discuss how supporting each other enhances efficiency and prevents errors in real work scenarios.
- ◆ **Reflect and Share:**
 - Encourage participants to share their thoughts on how they can apply the lessons learned from the activity to their daily work interactions.
- **Expected Outcome:** This activity will help participants experience the challenges of relying on their teammates' support and reinforce the importance of cooperation and effective communication. It also encourages problem-solving and teamwork, essential skills in a construction environment

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 5.3: Maintaining Social Diversity at Work

Unit Objectives

After the end of this unit, participants will be able to:

1. Discuss the fundamental concept of gender equality.
2. Explain how to recognise and be sensitive to issues of disability culture and gender.
3. Discuss legislation, policies, and procedures relating to gender sensitivity and cultural diversity including their impact on the area of operation.
4. Demonstrate effective implementation of gender-neutral practices at the workplace.
5. Demonstrate ways to address discriminatory and offensive behaviour in a professional manner as per organizational policy.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters depicting inclusivity practices at workplace.

Say

In this session, we shall learn about concept of gender equality, disability and gender Issues and cultural diversity.

Ask

- Why is creating a healthy and cooperative work environment important within gangs of workers on a construction site?
- Why is adhering to safety standards crucial for co-workers in a construction project? What are the potential consequences of neglecting safety?
- Can you share a personal experience or example where effective teamwork and cooperation led to the successful completion of a construction task?

Notes for facilitation

- Initiate the session with the participants by discussing the objectives of the module.
- Make the session interactive by asking the participants to share their expectations from the module on the blackboard/whiteboard.
- Introduce the topics to be covered and give some information about them.
- Give the participants a general idea about what will be covered in the module.

Elaborate

- Gender Equality
- Disability and Gender Issues
- Cultural Diversity
- Gender-neutral practices
- Organizational policy

Activity -1

- **Topic:** Diversity Role-Play
- **Purpose:** This activity aims to enhance participants' understanding of gender equality, disability awareness, cultural diversity, and professional behavior through interactive role-play scenarios.
- **Resources:**
 - ◆ Scenario cards (prepared in advance) depicting various workplace situations.
 - ◆ Props for role-play (optional).
- **Tentative Duration:** 30-45 minutes
- **Procedure:**
 - ◆ **Preparation:**
 - Prepare scenario cards that reflect real-life workplace situations related to gender, disability, cultural diversity, and professionalism.
 - Create a diverse range of scenarios that require participants to respond to various challenges.
 - ◆ **Introduction:**
 - Start by discussing the importance of sensitivity to gender equality, disability, and cultural diversity in the workplace.

- Briefly explain the activity and its goals.
- ◆ **Group Formation:**
 - Divide participants into small groups.
- ◆ **Scenario Role-Play:**
 - Distribute scenario cards to each group. Each scenario should involve challenges related to the topics covered in the learning objectives.
 - Instruct each group to read and discuss the scenario, assigning roles for each group member.
- ◆ **Role-Play:**
 - Groups take turns performing their role-plays based on the scenarios assigned.
 - Encourage participants to immerse themselves in their roles and respond authentically.
- ◆ **Discussion:**
 - After each role-play, open the floor for a discussion.
- ◆ **Ask questions like:**
 - How did the group handle the situation?
- ◆ What aspects of gender equality, disability awareness, or cultural diversity were addressed?
 - Were there any challenges or dilemmas faced during the role-play?
- ◆ **Alternate Responses:**
 - For each scenario, have different groups present alternative responses to showcase diverse ways of addressing the challenges.
- ◆ **Debrief and Reflection:**
 - After all role-plays are performed, facilitate a debriefing session.
 - Discuss insights gained, lessons learned, and potential improvements in handling similar situations.
- ◆ **Link to Learning Objectives:**
 - Relate the role-play scenarios to the key learning objectives, highlighting how each scenario reflects real-world challenges.
- **Expected Outcome:** This activity encourages participants to apply their knowledge of gender equality, disability awareness, cultural diversity, and professionalism in practical scenarios. It promotes empathy, critical thinking, and collaborative problem-solving while reinforcing the importance of respectful and inclusive behavior in a diverse workplace.

Say 

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do 

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation 

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Exercise

Key Solutions to PHB Exercise

Answer the following:

A.

1. Effective communication is crucial in construction job roles because it ensures that all team members understand their tasks, responsibilities, and project goals. Clear communication minimizes misunderstandings, reduces errors, and promotes efficient workflow, leading to timely completion of projects and improved overall project quality.
2. Poor teamwork in construction projects can result in delayed timelines, compromised project quality, increased safety risks, and higher costs. Lack of coordination and collaboration among team members can lead to mistakes, rework, and accidents at the construction site.
3. To pass on work-related information clearly to your team members, you can use concise and specific language, avoid jargon, and provide written or visual aids when necessary. Regular team meetings, progress reports, and digital communication tools can also aid in effective information dissemination.
4. Effective communication is vital in construction work. Modes like verbal communication (face-to-face, phone), written communication (emails, memos), digital communication (instant messaging, video conferencing), and visual communication (charts, diagrams) ensure tasks are clear, safety is prioritized, and collaboration is seamless among workers.
5. Creating a healthy and cooperative work environment among gangs of workers in construction fosters better communication, trust, and collaboration. This leads to improved productivity, reduced conflicts, and enhanced safety awareness. A positive work environment also boosts morale and job satisfaction among workers.

2.

1. Effective
2. Quality
3. Concise
4. Digital
5. Unity

3.

1. False
2. False
3. False
4. False
5. True

Notes



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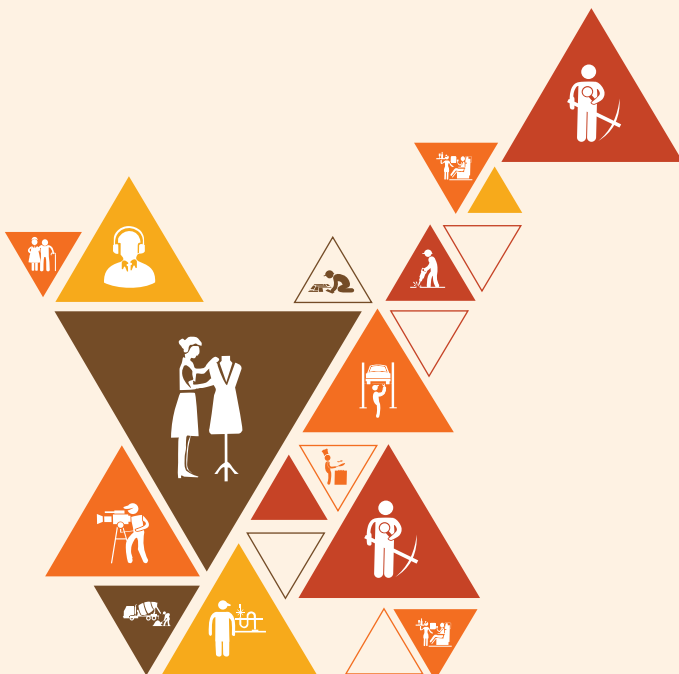
Transforming the skill landscape



6. Plan and organize work to meet expected outcomes

Unit 6.1 - Planning and Organizing Work Activities

Unit 6.2 - Efficient Implementation and Resource Management



CON/N8002

Key Learning Outcomes

After the end of this module, participants will be able to:

1. Explain the importance of proper housekeeping including safe waste disposal.
2. Discuss policies, procedures and work targets set by superiors.
3. Explain how to identify work activities that need to be planned and organized.
4. Explain how to determine the task requirements.
5. Explain how to determine the quality requirements related to the task.
6. Elucidate how to undertake all aspects of planning and organizing the task, including interpretation of task, reading drawings/schedules, arranging resources, reporting problems etc.
7. Explain how to implement the planned activities.
8. Demonstrate ways to determine the work requirements corresponding to the task (drawings/schedules/instructions/methodology), safety, tools and equipment prior to the commencement of the task.
9. Show how to prepare the work areas in coordination with team members.
10. Demonstrate the procedures for organizing the required materials, tools and tackles required for the task.
11. Demonstrate how to use resources in an optimum manner to avoid any unnecessary wastage.
12. Demonstrate the practices to use tools, tackles, and equipment carefully to avoid damage.
13. Show how to clean and organize the workplace after completion of tasks.

Unit 6.1: Planning and Organizing Work Activities

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain the importance of proper housekeeping, including safe waste disposal.
2. Discuss policies, procedures, and work targets set by superiors.
3. Explain how to identify work activities that need to be planned and organized.
4. Explain how to determine the task requirements.
5. Explain how to determine the quality requirements related to the task.
6. Elucidate how to undertake all aspects of planning and organizing the task, including interpretation of task, reading drawings/schedules, arranging resources, reporting problems etc.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters related to explaining the significance of proper housekeeping and safe waste disposal, slides detailing the importance of adhering to company policies and procedures, hierarchy and chain of command within the organization, process of identifying high-priority tasks, etc.

Say

In this session, we will learn about the essential components of effective work management and organization. Our exploration will encompass various key topics, including the importance of proper housekeeping and safe waste disposal, an in-depth discussion of organizational policies, procedures, and work targets, methods for identifying and prioritizing tasks for optimal planning and organization, techniques for determining task and quality requirements, and a comprehensive elucidation of every facet involved in the planning and execution of tasks. Prepare to enhance your skill set and gain valuable insights into achieving efficiency and excellence in your work processes.

Ask

- How can maintaining proper housekeeping and practicing safe waste disposal contribute to a safer and more efficient work environment?
- Could you provide an example of how aligning with organizational policies, procedures, and work targets positively impacts both individual and team performance?

Elaborate

In this unit, we will discuss the following topics:

- Importance of Proper Housekeeping and Safe Waste Disposal
- Policies, Procedures, and Work Targets
- Identifying Work Activities for Planning and Organization
- Determining Task Requirements
- Quality Requirements Related to the Task
- Planning and Organizing Tasks: Interpretation, Resource Allocation, and Problem Reporting

Activity -1

- **Activity:** Case Study and Group Discussion
- **Objective:** Explain the Importance of Proper Housekeeping, Including Safe Waste Disposal
- **Scenario:** Imagine you are part of a construction team working on a project that involves building a new structure. Your team has been tasked with erecting formwork for concrete pouring. However, the construction site has been cluttered and disorganized, with waste materials scattered around. The project manager emphasizes the need for proper housekeeping and safe waste disposal to ensure a safe and efficient work environment.
- **Activity Steps:**
 - ◆ Case Study Analysis:
 - ◆ Read the provided scenario carefully, considering the challenges posed by the disorganized site.
 - ◆ Identify potential safety hazards and inefficiencies caused by poor housekeeping and waste disposal.
- **Group Discussion:**
 - ◆ Form small groups and discuss your observations from the case study.
 - ◆ Share your insights on how proper housekeeping and waste disposal could improve the work environment and project efficiency.
 - ◆ Brainstorm specific examples of accidents or delays that could arise from inadequate housekeeping.
- **Benefits Exploration:**
 - ◆ Discuss with your group the direct and indirect benefits of proper housekeeping and waste disposal in a construction context.
 - ◆ Consider aspects such as worker safety, time efficiency, quality of work, compliance with

regulations, and environmental impact.

- **Solution Generation:**
 - ◆ Collaboratively come up with practical solutions to address the housekeeping and waste disposal challenges in the case study.
 - ◆ Propose strategies to organize the workspace, manage waste, and establish a safer environment.
- **Presentation:**
 - ◆ Each group presents their insights, benefits, and solutions to the larger group.
 - ◆ Encourage discussions and interactions among different groups to foster a comprehensive understanding of the topic.
- **Reflection:**
 - ◆ As a whole group, reflect on the key takeaways from the case study and the group discussions.
 - ◆ Emphasize the importance of maintaining a clean and organized workspace, and how it contributes to the overall success of construction projects.
- **Expected Outcome:** By engaging in this case study and group discussion activity, learners will gain a deeper understanding of the significance of proper housekeeping and safe waste disposal in construction work. They will also learn how these practices impact safety, efficiency, and the quality of the final product.

Activity -2

- **Purpose:** To help participants understand the importance of different policies in the role of a Shuttering Carpenter and match them to their respective categories.
- **Duration:** 20 minutes
- **Materials Needed:**
 - ◆ Index cards or sticky notes
 - ◆ Markers
 - ◆ Poster board or wall space
- **Preparation**
 - Write down the following policies on separate index cards or sticky notes: Safety Policies, Quality Standards, Environmental Policies, Formwork Construction Procedures, Material Handling Procedures, Safety Procedures, Inspection and Maintenance Procedures.
 - Category Labels

- **Create labels for three categories:** “Policies,” “Procedures,” and “Targets.” Place these labels on the poster board or wall space.
- **Matching Game**
 - Distribute the policy index cards randomly among the participants.
 - Instruct participants to read their policy and decide whether it belongs to the “Policies,” “Procedures,” or “Targets” category.
 - Have participants place their index cards under the appropriate category labels.
- **Group Discussion (3 minutes)**
 - Once all the index cards are sorted, gather the participants and go through each category.
 - Discuss the correct categorization for each policy and briefly explain its importance in the role of a Shuttering Carpenter.
- **Review and Conclusion (2 minutes)**
 - Summarize the key points learned from the activity.
 - Emphasize that understanding and following policies, procedures, and targets are essential for safe and efficient construction work.
- **Expected Outcome:** The “Construction Policy Match-Up” activity is expected to help participants understand the significance of different policies, procedures, and work targets for Shuttering Carpenters. Through interactive categorization and group discussions, participants will recognize the importance of adhering to safety measures, following accurate procedures, and achieving work targets for efficient and secure construction operations.

Activity -3

- **Topic:** Prioritize and Optimize: Effective Work Management
- **Objective:** To help participants understand the importance of prioritizing and optimizing work tasks for improved efficiency and productivity.
- **Duration:** 30 minutes
- **Materials Needed**
 - ◆ Printed copies of the provided content (if available) for participants
 - ◆ Whiteboard and markers
- **Instructions:**
 - ◆ Introduction

- Briefly explain the significance of prioritizing and optimizing work tasks in a construction context.
- Highlight the benefits of effective task management, such as increased efficiency and reduced stress.
- ◆ **Prioritization Exercise**
 - Provide participants with a list of tasks related to shuttering work (similar to the provided list in the content).
 - Ask participants to individually prioritize the tasks based on the given criteria (importance, urgency, value, effort).
 - Discuss the factors they considered and their rationale for prioritizing tasks.
- ◆ **Group Discussion: Prioritization**
 - Facilitate a group discussion where participants share their prioritization choices and reasons.
 - Emphasize the importance of distinguishing urgent vs. important tasks and considering task value.
- ◆ **Scheduling and Multitasking Activity**
 - Introduce the concept of scheduling and multitasking.
 - Divide participants into pairs or small groups.
 - Provide each group with a set of tasks and ask them to create a flexible schedule for completing these tasks.
 - Encourage them to discuss the benefits of scheduling and strategies for effective multitasking.
- ◆ **Group Discussion: Scheduling and Multitasking**
 - Have each group present their created schedule and explain their approach to multitasking.
 - Discuss the challenges and advantages of multitasking in construction scenarios.
- ◆ **Work Progress Tracking Exercise**
 - Discuss the importance of tracking work progress and making necessary adjustments.
 - Using the whiteboard, draw a simple chart representing a work schedule with tasks and timeframes.
 - Ask participants to suggest methods for tracking progress and making amendments.
- ◆ **Conclusion and Takeaways (5 minutes)**
 - Summarize the key points covered in the activity.

- Reinforce the benefits of effective prioritization, scheduling, and tracking in construction work.
- Encourage participants to apply these strategies in their daily tasks for improved work management
- **Expected Outcome:** This activity engages participants through hands-on exercises and discussions, allowing them to practice prioritization, scheduling, and multitasking concepts in a construction context. It aims to enhance their understanding of how these techniques contribute to better task management and overall project efficiency.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 6.2: Efficient Implementation and Resource Management

Unit Objectives

After the end of this unit, participants will be able to:

1. Demonstrate ways to determine the work requirements corresponding to the task (drawings/schedules/instructions/methodology), safety, tools and equipment prior to the commencement of the task.
2. Show how to prepare the work areas in coordination with team members.
3. Demonstrate the procedures for organizing the required materials, tools and tackles required for the task.
4. Demonstrate how to use resources in an optimum manner to avoid any unnecessary wastage.
5. Demonstrate the practices to use tools, tackles, and equipment carefully to avoid damage.
6. Show how to clean and organize the workplace after completion of tasks.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters related to preparing work areas, practising tools and equipment, handling tools and organizing workplace.

Say

In this session, participants will delve into the essential practices and techniques for efficient and successful construction tasks. We'll explore how to assess work requirements, ensure safety, coordinate with team members, organize materials and tools, optimize resource usage, prevent wastage, and maintain equipment and workspace. By the end of this chapter, you'll be equipped with the knowledge and skills to approach construction tasks systematically and with a focus on productivity, safety, and effectiveness."

Ask

- How do you make sure you know what needs to be done before starting a task? Can you give an example?
- Can you tell me about a time when you worked together with your team to set up a work area? How did it help?

- What steps do you take to gather all the materials and tools you need for a task? Why is this important?
- Why is it important to handle tools and equipment with care? Can you share an experience related to this?

Elaborate

In this unit, we will discuss the following topics:

- Creating a Healthy and Cooperative Work Environment
- Applicable Techniques and Materials in Construction
- Effective Communication in Construction
- Supporting Co-Workers for Smooth Functioning
- Timely Material Handover and Interfacing Teams

Activity -1

- **Objective:** To understand the principles of resource organization, optimization, and controlling in a practical context.
- **Materials Needed:**
 - ◆ Pen and paper
 - ◆ Cards with different job roles (e.g., Manager, Worker, Coordinator)
 - ◆ Timer
- **Instructions:**

Resource Organization and Planning:

 - Divide the participants into small groups.
 - Provide each group with a scenario (e.g., organizing a team to set up a booth at a trade fair).
 - Ask each group to identify the activities involved, classify and group them logically.
 - Have them identify the necessary tools, equipment, and materials for the task.
 - Assign roles and responsibilities among the group members based on their strengths.

Resource Allocation and Optimization:

 - Introduce a card system representing different job roles (Manager, Worker, Coordinator).

- Each participant draws a card randomly that assigns them a role.
- Give them a task (e.g., constructing a paper tower) and allocate resources (workers and tools).
- Participants must decide how to optimize their resources to complete the task effectively and efficiently.

Controlling and Problem Solving:

- Set up a simulation where participants need to construct a puzzle within a specific time limit.
- As the activity progresses, introduce unexpected deviations, such as missing puzzle pieces.
- Participants must adapt and use controlling measures to address the deviations and keep the task on track.

Optimizing Resource Use in Teams:

- Form teams and provide a list of tasks with different requirements.
- Each team must decide which team member is best suited for each task based on their strengths and skills.
- Rotate team members among tasks to ensure everyone gains varied experience and training.

Discussion and Reflection:

- After each activity, have a group discussion to share insights and lessons learned.
- Discuss how proper organization, allocation, and optimization of resources contributed to task success.
- Reflect on the challenges faced during controlling deviations and how corrective measures were implemented.

Group Presentation:

- Ask each group to summarize their experiences and learnings.
- Encourage them to highlight the key principles they applied in resource organization, optimization, and controlling.

Conclusion:

Through this activity, participants will gain a hands-on understanding of the concepts related to resource organization, optimization, and controlling. By applying these principles in various scenarios, they will develop practical skills to manage tasks, teams, and resources effectively, contributing to more efficient and successful outcomes.

Activity -2



- **Role Play Activity:** Responsible Tool Use Training
- **Objective:** To practice the careful use of tools, tackles, and equipment through a role play activity, emphasizing safety, proper techniques, and maintenance.
- **Materials Needed:**
 - ◆ Various tools, tackles, and equipment (real or replicas)
 - ◆ Printed cards with scenarios (e.g., using a drill, cutting with a saw)
 - ◆ Personal Protective Equipment (PPE) such as gloves, safety glasses, and earmuffs
- **Participants:** Group of trainees
- **Instructions:**
 - ◆ **Introduction:**
 - Briefly explain the importance of practicing careful tool use for safety and quality work.
 - Emphasize the steps mentioned in the content for familiarization, inspection, proper usage, handling, etc.
 - ◆ **Role Play Preparation:**
 - Assign each participant a role: Tool User, Safety Supervisor, and Observer (for feedback).
 - Distribute printed scenario cards to each Tool User, detailing the tool, task, and precautions.
 - Provide appropriate PPE to the Tool Users.
 - Role Play:
 - Each Tool User performs their designated task while adhering to the steps mentioned in the content.
 - The Safety Supervisor monitors the proper use of tools, tackles, and equipment, ensuring safety measures are followed.
 - The Observer takes note of any deviations from the guidelines.
 - ◆ **Discussion and Feedback :**
 - Gather all participants for a discussion.
 - Ask each Tool User to share their experience and challenges faced during the role play.
 - The Safety Supervisor and Observer provide constructive feedback on safety

measures, techniques, and overall performance.

- ◆ **Group Reflection:**
 - Discuss the importance of following proper techniques and safety measures during tool use.
 - Reflect on the potential consequences of improper tool handling and the benefits of responsible tool use.
- ◆ **Maintenance Demonstration:**
 - Conduct a demonstration of tool maintenance, such as cleaning, oiling, and storing.
 - Explain the significance of regular maintenance in ensuring tool longevity and performance.
- ◆ **Q&A Session :**
 - Allow participants to ask questions about tool usage, maintenance, and safety.
 - Provide answers and clarify any doubts.
- ◆ **Conclusion :**
 - Summarize the key takeaways from the activity, including the importance of following safety guidelines, using the right tools, and maintaining equipment.
- **Expected Outcome:** This role play activity engages participants in a practical and interactive learning experience. It helps reinforce the proper techniques and safety measures related to tool use. Additionally, the activity promotes teamwork, communication, and a deeper understanding of responsible tool handling.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic.
- Arrange audio-visual aids to make them understand practicing the careful use of tools, tackles, and equipment at the workplace.
- Ask the participants if they have any questions.

Exercise



Key Solutions to PHB Exercise

1. d. All of the above
2. True
3. True
4. d. All of the above
5. d) All of the above
6. True.



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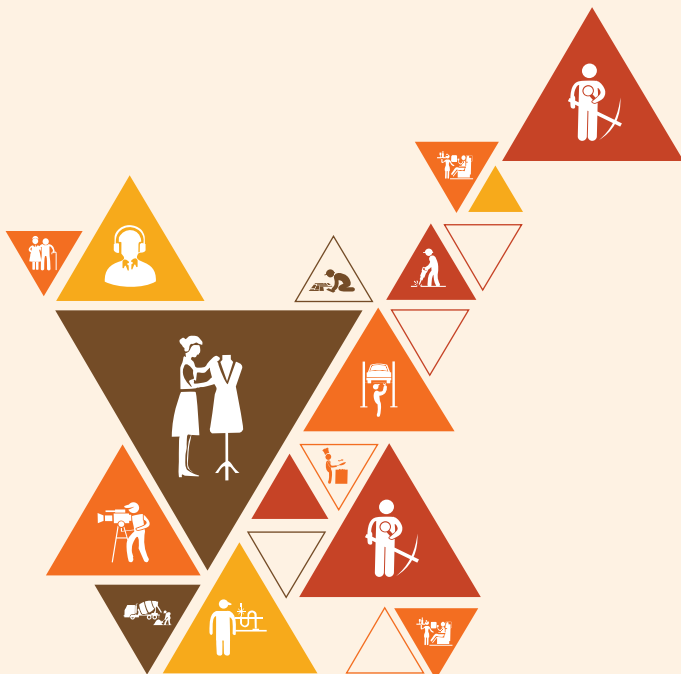
7. Maintaining a Safe, Hygienic and Secure Working Environment

Unit 7.1 - Hazards and Emergency Situations

Unit 7.2 - Safety Drills, PPEs and Fire Safety

Unit 7.3 - Hygiene and Safe Waste Disposal Practices

Unit 7.4 - Infectious Disease and Its Cure



CON/N9001

Key Learning Outcomes

After the end of this module, participants will be able to:

1. Explain the types of hazards at the construction sites
2. Identify the hazards specific to the painting and decoration work
3. Recall the safety control measures and actions to be taken under emergency situation
4. Explain the classes of fire and types of fire extinguishers
5. Demonstrate the operation of fire extinguisher.
6. Demonstrate different methods involved in providing first aid to the affected person.
7. Explain the importance of worker participation in safety/mock drills
8. Demonstrate the use of all Personal Protective Equipment (PPE) like helmet, safety shoe, safety belt, safe jackets and other safety equipment.
9. Explain the reporting procedure adopted in case of emergency situations
10. Describe the standard procedure for handling, storing and stacking of material, tools, equipment and accessories
11. Explain different types of wastes produced at a construction site including their disposal method
12. Explain the purpose and importance of vertigo test at construction site
13. Demonstrate vertigo test
14. List out basic medical tests required for working at construction Site
15. Explain the types of ergonomic principles adopted while carrying out specific task at the construction
16. Explain the benefits of basic ergonomic principles used at construction sites.
17. Explain the importance of housekeeping
18. Demonstrate housekeeping practice followed after painting and decoration works.

Unit 7.1: Hazards and Emergency Situations

Unit Objectives

After the end of this unit, participants will be able to:

1. Understand the types of hazards at the construction sites and identify the hazards specific to the domain related works.
2. Recognize the safety control measures and actions to be taken under emergency situations.
3. Know the reporting procedure to the concerned authority in case of emergency situations.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters depicting the types of hazards at the construction sites, use of PPEs as per work requirements during the construction painting job, etc.

Say

In this session, we shall learn about the importance of the types of hazards at the construction sites and identify the hazards, standard procedure for handling, storing and stacking of material, tools, equipment and accessories, PPEs as per work requirements during construction painting jobs, safety control measures and actions to be taken under an emergency situation, the types and benefits of basic ergonomic principles, etc.

Ask

- Does anyone know the types of hazards at the construction sites?
- Why do you think it is important to use PPEs as per work requirements during construction jobs?

Elaborate

In this unit, we will discuss the following topics:

- Workplace Safety
- Workplace Safety at Construction Site
- Workplace Hazards

- Workplace Hazard at Construction Site
- Hazard Identification and Risk Assessment (HIRA)
- Workplace Warning Signs
- Personal Protective Equipment
- Basic Ergonomic Principles
- Emergency Response Plan for Construction Site

Activity (Roleplay)



- **Purpose:** The purpose of this practical activity is to educate students about the importance of Personal Protection Equipment (PPE) used at construction sites.
- **Resources Required:** Various PPE (e.g., hard hat, safety goggles, earplugs, dust masks, reflective vests, gloves, and safety boots), hazard posters, and safety guidelines.
- **Tentative Duration:** 60-90 minutes
- **Procedure:**
 - ◆ Introduction: Discuss workplace safety and PPE's significance.
 - ◆ Hazard Awareness: Identify construction site hazards.
 - ◆ Set up stations with examples of different types of PPE.
 - ◆ Divide the students into groups and assign each group to a station.
 - ◆ Instruct each group to inspect the PPE, discuss its purpose, and identify the types of hazards it protects against.
 - ◆ Allow students to try on the PPE to experience how it fits and functions.
 - ◆ Gather the students for a recap of the key points learned during the activity.
 - ◆ Encourage questions and facilitate a Q&A session to address any remaining doubts.
- **Expected outcome:** The participants will understand PPE's importance, recognize hazards, and know how to use various PPE correctly.

Notes for facilitation



- Arrange the relevant handouts and leaflets for a better understanding of the topics
- Arrange audio-visual aids for a better understanding of the topics.
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 7.2: Safety Drills, PPEs and Fire Safety

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain the classes of fire and types of fire extinguishers.
2. Demonstrate the operating procedure of the fire extinguishers.
3. Explain the importance of participation of workers in safety drills.
4. List out basic medical tests required for working at construction site.
5. Explain the purpose and importance of vertigo test at construction site.
6. Explain the types and benefits of basic ergonomic principles, which should be adopted while carrying out specific task at the construction sites.
7. Demonstrate use of PPEs as per work requirements.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters depicting the steps in safety drills, different methods involved in providing First aid to the affected person, safe waste disposal practices followed at construction site, etc.

Say

In this session, we shall learn about the importance of housekeeping works, purpose and importance of vertigo test at construction site, basic medical tests required for working at construction site, different methods involved in providing First aid to the affected person, safe waste disposal practices, etc.

Ask

- Why do you think the safe housekeeping practices are important at construction site?
- Can you tell me how should the construction waste disposed of?

Elaborate

In this unit, we will discuss the following topics:

- Safety, Health and Environment at Work Place
- Good Housekeeping
- Safety Drills at Construction Site

- Medical Examination for Construction Workers
- Vertigo Test
- First Aid
- Treating Minor Cuts and Scrapes
- Waste Management

Activity (Roleplay)



- **Purpose:** The participant will learn more about the first aid kits in this activity.
- **Resources Required:** Computer, internet.
- **Tentative Duration:** 1 Hour
- **Process:**
 - Divide participants into 5 groups and provide them with first aid kit essentials.
 - Ask them to surf the internet and explain the usage of each item included in the kit.
 - Alternatively show them a video about the usage and ask them to make notes.
 - Also, provide them cardboard, paper, scissors, glue stick, and colour pens to make the first aid box.
- **Estimated Outcome:** The participants will have detailed knowledge about first aid kits.

Notes for facilitation



- Arrange the relevant handouts and leaflets for a better understanding of the topics
- Arrange audio-visual aids for a better understanding of the topics.
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 7.3: Hygiene and Safe Waste Disposal Practices

Unit Objectives

After the end of this unit, participants will be able to:

1. Follow the practices to maintain personal hygiene, workplace hygiene and site/ workplace sanitization
2. Understand the importance of housekeeping works
3. Keep an eye on safe housekeeping practices
4. Understand different types of waste at construction sites and their disposal method
5. Know safe waste disposal practices followed at construction site

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.
- PowerPoint slides, pictures/posters related to prioritization of tasks, strategic planning, Recognition and arrangement of resources.

Say

In this session, students will learn about maintaining hygiene and sanitation, understanding housekeeping's significance, practicing safe waste disposal, and implementing effective site organization for construction safety and efficiency.

Ask

- Why do you think maintaining hygiene and sanitation is crucial on construction sites? What potential risks or challenges can arise from neglecting these practices?

Elaborate

In this unit, we will discuss the following topics:

- Hygiene and Sanitization Practices
- Importance of Housekeeping
- Safe Housekeeping Practices
- Types of Waste at Construction Sites
- Waste Disposal Methods
- Safe Waste Disposal Practices at Construction Sites

Activity



- **Topic:** Waste Sorting and Disposal Simulation
- **Purpose:** Allow students to experience and understand the importance of proper waste disposal methods at construction sites.
- **Resources Required:**
 - ◆ Variety of paint colors and types
 - ◆ Different types of brushes, rollers, and painting tools
 - ◆ Sample walls or surfaces for painting
 - ◆ Timer or stopwatch
 - ◆ Cost calculation sheets
- **Tentative Duration:** 45 minutes
- **Procedure:**
 - ◆ **Introduction (5 minutes)**
 - Explain the importance of responsible waste disposal in construction to minimize environmental impact and ensure safety.
 - Briefly discuss different types of waste commonly found at construction sites.
 - ◆ **Waste Sorting Challenge (15 minutes)**
 - Distribute gloves and masks to each participant.
 - Place the bins labeled with waste categories in a visible area.
 - Provide a mix of waste materials to the participants.
 - Instruct participants to sort the waste materials into the appropriate bins based on their category.
 - ◆ **Discussion and Reflection (15 minutes)**
 - After sorting, gather the participants and discuss the challenges they faced during the activity.
 - Reflect on the significance of proper waste sorting in terms of recycling, safety, and environmental impact.
 - ◆ **Waste Disposal Methods (10 minutes)**
 - Present different waste disposal methods, such as recycling, reusing, and proper disposal, and their implications.
 - Discuss why following correct disposal methods is crucial in construction projects.
 - ◆ **Application and Takeaways (5 minutes)**

- Ask participants to share their insights on how the activity relates to real construction site waste management.
- Emphasize the importance of responsible waste disposal practices in their future careers.
- **Expected outcome:** Participants will gain practical experience in sorting and understanding the various types of waste at construction sites. They will also comprehend the significance of adhering to proper waste disposal methods for safety, environmental preservation, and regulatory compliance. This activity will promote awareness and responsible behavior regarding waste management in construction settings.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic.
- Arrange audio-visual aids to make them understand effective communication at the workplace
- Ask the participants if they have any questions.

Unit 7.4: Infectious Disease and Its Cure

Unit Objectives

After the end of this unit, participants will be able to:

1. Know different types of infectious disease that can spread/ originate at a construction site
2. Understand the ways of transmission of the various infectious disease.
3. Recognize the methods to check the spread of the infectious disease.
4. Understand the symptoms and cure of the various infectious disease.
5. Apprehend the procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic.

Resources to be used

- **Theory**
 - ◆ Training Kit - Trainer Guide & Participant Handbook, Presentations, Whiteboard, Marker, Projector, Laptop, Video Films.
- **Practical**
 - ◆ Leather Hand Gloves, Jump suit, Wire brush, Hand and Leg guard leather, Safety goggles, Nose mask, Ear protection, Fire extinguishers, Sand buckets Flashback arrestors, Welding helmet, Welding glass, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags and Safety Notice board.

Do

- Clarify different types of infectious disease that can spread/ originate at a construction site
- Explain the ways of transmission of the various infectious disease.
- Mention the methods to check the spread of the infectious disease.
- Explain the symptoms and cure of the various infectious disease.
- Apprehend the procedure to report to the concerned authority regarding the outbreak/ hazard of any infectious disease/ pandemic.

Notes for facilitation

- Use the Shuttering Carpenter PHB and refer unit 7.4 to explain Infectious Disease and Its Cure.
- Infectious diseases that can spread or originate at construction sites include:
 - ◆ Respiratory Infections: Such as the flu, common cold, and COVID-19.

- ◆ Skin Infections: Like bacterial infections, fungal infections, and rashes.
- ◆ Gastrointestinal Infections: Including foodborne illnesses due to poor hygiene.
- ◆ Vector-Borne Diseases: Like mosquito-borne diseases (e.g., Zika, dengue) due to stagnant water.
- **Ways of Transmission of Infectious Diseases:**
 - ◆ Airborne Transmission: Respiratory infections can spread through respiratory droplets released when an infected person coughs, sneezes, or talks.
 - ◆ Direct Contact: Skin infections can be transmitted through direct skin-to-skin contact or contact with contaminated surfaces.
 - ◆ Fecal-Oral Route: Gastrointestinal infections can spread through contaminated food, water, or surfaces.
 - ◆ Vector-Borne Transmission: Insects like mosquitoes can carry and transmit diseases from person to person.
- **Methods to Check the Spread of Infectious Diseases:**
 - ◆ Hand Hygiene: Regularly washing hands with soap and water or using hand sanitizers.
 - ◆ Respiratory Hygiene: Covering mouth and nose when coughing or sneezing.
 - ◆ Personal Protective Equipment (PPE): Wearing appropriate PPE like masks and gloves.
 - ◆ Disinfection: Regularly cleaning and disinfecting surfaces and shared equipment.
- **Understanding Symptoms and Cure of Infectious Diseases:**
 - ◆ Respiratory Infections: Symptoms include fever, cough, sore throat, and shortness of breath. Treatment includes rest, fluids, and in severe cases, medical attention.
 - ◆ Skin Infections: Symptoms include redness, swelling, itching, and rashes. Treatment depends on the type of infection and may involve antibiotics or antifungal medications.
 - ◆ Gastrointestinal Infections: Symptoms include nausea, vomiting, diarrhea, and abdominal pain. Treatment involves staying hydrated and in severe cases, medical intervention.
 - ◆ Vector-Borne Diseases: Symptoms vary based on the disease. Treatment ranges from supportive care to specific antiviral or antibiotic medications.
- **Reporting Infectious Disease Outbreaks to Concerned Authorities:**
 - ◆ Immediate Reporting: If an infectious disease outbreak is suspected, immediately inform your supervisor, manager, or the designated health and safety personnel.
 - ◆ Follow Protocols: Follow the organization's protocols for reporting infectious diseases or pandemics, including informing co-workers who may have been exposed.
 - ◆ Health Authorities: If necessary, local health authorities should be contacted to ensure proper containment and response.
 - ◆ Understanding, preventing, and reporting infectious diseases is crucial to maintaining a healthy and safe working environment in the Masonry industry. It protects both workers and the community from potential health risks.

Say

Let's participate in a practical activity focused on the reporting procedures that a shuttering carpenter should follow in the event of an infectious disease outbreak. This activity highlights the critical importance of swift and accurate reporting to maintain the health and safety of everyone on the construction site.

Activity

- **Purpose:** This activity aims to provide Shuttering Carpenter with hands-on experience in understanding and practicing the reporting procedures necessary for responding effectively to infectious disease outbreaks.
- **Resources Required:** Scenario cards depicting infectious disease outbreak situations, writing materials.
- **Tentative Duration:** 45 Minutes
- **Procedure:**
 - ◆ **Introduction:** Begin by discussing the vital role of immediate and accurate reporting during infectious disease outbreaks to safeguard the health of all individuals on the construction site.
 - ◆ **Scenario Distribution:** Distribute scenario cards, each portraying a distinct infectious disease outbreak situation, to participants.
 - ◆ **Immediate Reporting Role Play:**
 - Form pairs among participants.
 - Assign roles: one participant as the Helper Mason and the other as the supervisor or health and safety personnel.
 - Helper Masons practice promptly informing their supervisor or designated personnel about the infectious disease outbreak in their assigned scenario.
 - ◆ **Discussion on Protocol Adherence:**
 - Gather participants for a discussion about the organization's protocols for reporting infectious diseases or pandemics.
 - Emphasize the importance of following these protocols for effective containment.
 - ◆ **Health Authorities Interaction Exercise:**
 - Present a scenario requiring interaction with local health authorities.
 - Participants engage in role-play, contacting health authorities if necessary to ensure proper response and containment measures.

- ◆ **Group Discussion and Sharing:**
 - Participants share their experiences and insights from the role-playing exercises.
 - Facilitate a discussion on challenges faced and the significance of accurate reporting during infectious disease outbreaks.
- ◆ **Reflection and Conclusion:**
 - Engage participants in reflecting on the critical role of reporting procedures in safeguarding the health of the construction site community.
 - Summarize the key takeaways and underline the importance of swift reporting and following established protocols.
- **Expected Outcome:** Through this activity, shuttering carpenter will gain practical understanding of reporting infectious disease outbreaks. They will recognize the significance of immediate reporting, protocol adherence, and cooperation with health authorities in ensuring the safety and health of themselves and their colleagues on the construction site.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Exercise

Key Solutions to PHB Exercise

A. Short Questions' Answer:

- 1) Reporting procedures for breaches or hazards at the construction site involve notifying supervisors or management immediately as per established guidelines.
- 2) Common safety hazards at construction sites include falls, electrical hazards, confined spaces, struck-by or caught-in-between incidents, and chemical exposure.
- 3) Demonstrating emergency and evacuation procedures involves knowing evacuation routes, using fire alarms, assisting injured individuals, and assembling at designated safe areas.
- 4) Basic ergonomic principles focus on designing workspaces and tasks to fit the worker's abilities, reducing strain and discomfort during construction activities.
- 5) In response to accidents and emergencies, steps include assessing the situation, providing first aid if necessary, notifying supervisors, securing the area, and cooperating with emergency responders.

B. Fill-in-the-Blanks Questions' Answer:

- 1) Proper handling of tools, equipment, and materials is essential as per applicable norms.
- 2) Different types of fire extinguishers correspond to various types of fires.
- 3) Using hazardous materials safely involves following standard guidelines.
- 4) Proper disposal methods are important to manage construction waste.
- 5) Personal Protective Equipment (PPE) includes items like head protection, ear protection, and fall protection.

C. True/False Questions' Answer:

- 1) False
- 2) True
- 3) False
- 4) False
- 5) False



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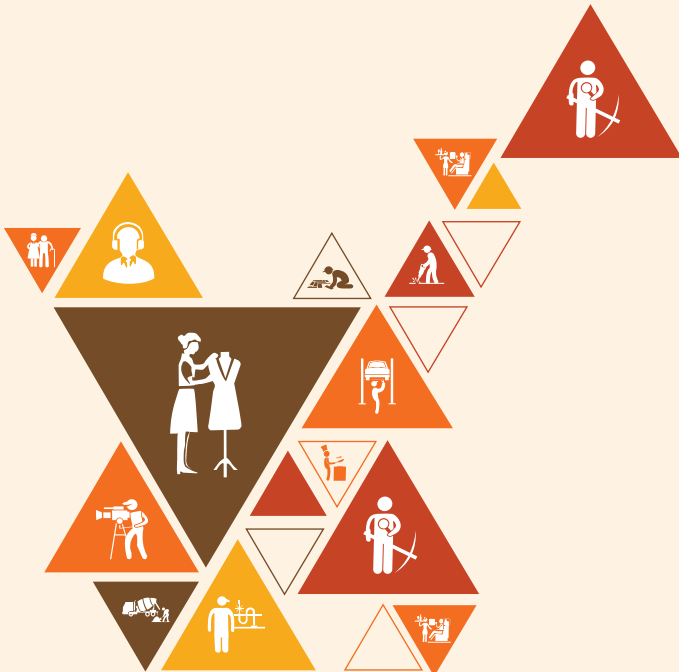


8. Employability Skills (60 Hours)

It is recommended that all trainings include the appropriate Employability skills Module. Content for the same can be accessed

<https://www.skillindiadigital.gov.in/content/list>

Scan the QR code below to access the ebook



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9. Assemble and Dismantle System Formwork (Elective-1)

Unit 9.1 - Introduction to Formwork

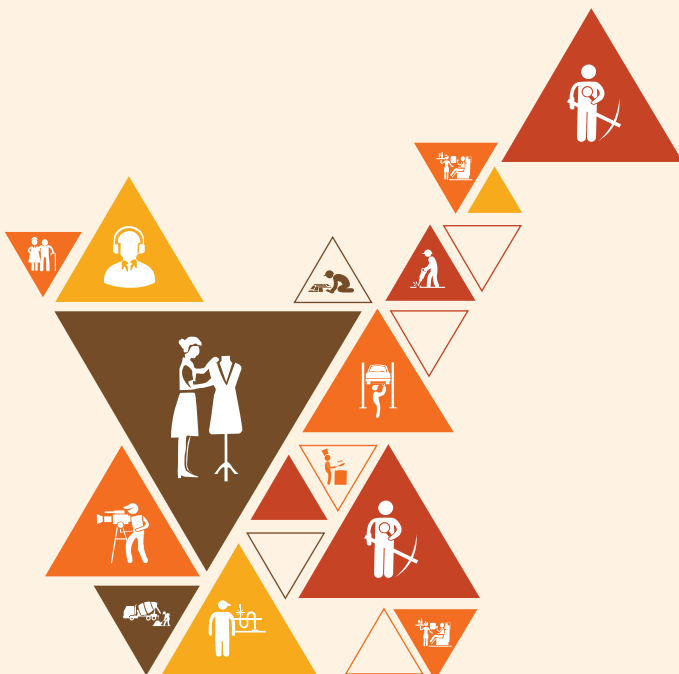
Unit 9.2 - Assemble And Dismantle System Formwork

Unit 9.3 - Assembling and Dismantling of Aluminum Formwork

Unit 9.4 - Stripping Time of Formwork

Unit 9.5 - Repair of Shuttering Panels

Unit 9.6 - Stacking and Storing of Formwork Component



CON/N0303

Key Learning Outcomes

After the end of this module, participants will be able to:

1. Explain how to interpret the sketches/schematic working drawing relevant to system formwork.
2. Discuss the differences between conventional and system formwork.
3. Discuss system formwork and its types.
4. List the various types of shuttering materials with their specifications.
5. Discuss consumables used in shuttering work.
6. Explain different types of releasing agents (shuttering oil, cream emulsions, chemical release agents).
7. State the general tolerance limit for shuttering works.
8. Determine the shuttering materials required for work.
9. Demonstrate reading schematic working drawings for shuttering works.
10. Show how to perform checks to ensure cleanliness of shutters, suitability of the supporting base, availability of tools, availability of components, availability of fixtures prior to the erection/use of system formwork.
11. Explain the importance of stripping time for removing the shuttering of various R.C.C structural elements.
12. Describe the procedure for repairing the formwork.
13. Discuss the use of lifting gears for shifting and fixing formwork components.
14. Explain the standard procedure for stacking and storing formwork components.
15. Demonstrate assembling system formwork for R.C.C footing, column, wall, beam, and slab.
16. Demonstrate methods to check the erected formwork for line, level, alignment, and plumb within tolerance limits.
17. Discuss the standard procedure for dismantling system formwork for R.C.C footing, column, wall, beam, and slab.
18. Show how to check the quality of formwork materials for reusability after dismantling.
19. Demonstrate stacking of formwork components.

UNIT 9.1: Introduction to System Formwork

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain how to interpret the sketches/ schematic working drawing relevant to system formwork.
2. Discuss about system formwork and its types.
3. Describe the difference between conventional and system formwork.
4. List the various types of shuttering material with their specifications.
5. Discuss about consumables used in shuttering work.
6. Explain different types of releasing agents (shuttering oil, cream emulsions, chemical release agents).
7. Demonstrate reading of schematic working drawing for shuttering works.
8. Show how to perform checks to ensure cleanliness of shutters, suitability of supporting base, availability of tools, availability of components, availability of fixtures prior to erection/use of system formwork.

Resources to be used

Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computers, projectors, flipcharts etc.

PowerPoint slides, pictures/posters related to system formwork, types, conventional and system formwork, various shuttering material, reading of drawing.

Say

In this session, learners will grasp the art of interpreting schematic working drawings pertinent to system formwork, comprehend the intricacies of diverse system formwork types, discern the disparities between traditional and modern formwork methodologies, familiarize themselves with various shuttering materials alongside their specifications, delve into the realm of formwork consumables, understand the nuances of different releasing agents, master the skill of reading schematic working drawings tailored for shuttering tasks, and become adept at performing meticulous checks to guarantee the cleanliness of shutters, suitability of support bases, tool availability, component readiness, and fixture availability before erecting or utilizing system formwork.

Ask

- How can maintaining proper housekeeping and practicing safe waste disposal contribute to a safer and more efficient work environment?
- Could you provide an example of how aligning with organizational policies, procedures, and work targets positively impacts both individual and team performance?

Elaborate

In this unit, we will discuss the following topics:

- How does understanding the differences between conventional and modern system formwork impact construction efficiency and project outcomes?
- What critical factors should be considered when selecting the appropriate type of releasing agent for a specific formwork application, and how do these choices affect both construction quality and safety?

Activity -1

- **Objective:** To reinforce learners' understanding of pre-erection checks for system formwork and their importance in ensuring safe and efficient construction practices.
- **Materials Needed:**
 - ◆ Visual aids depicting schematic working drawings
 - ◆ List of pre-erection checks
 - ◆ Sample components of system formwork (can be physical or represented in images)
 - ◆ Checklist for learners
- **Instructions:**
 1. **Introduction:** Begin by discussing the significance of pre-erection checks in the construction industry, emphasizing their role in ensuring the safety, quality, and effectiveness of formwork installations.
 2. **Explanation of Pre-Erection Checks:** Present the list of pre-erection checks, which include criteria such as cleanliness of shutters, suitability of the supporting base, tool availability, component readiness, and fixture availability.
 3. **Schematic Working Drawings:** Provide learners with visual aids depicting schematic working drawings for a specific formwork project. Explain that their task is to identify potential issues by analyzing the drawings.
 4. **Component Identification:** Introduce learners to sample components of system formwork. Highlight how these components are represented in the drawings and explain their importance in the overall structure.
 5. **Activity:** Divide learners into small groups. Each group will receive a set of visual aids, sample components, and the checklist of pre-erection checks. Their task is to:
 - Study the schematic working drawings and identify any discrepancies or issues related to the pre-erection checks.
 - Match the sample components to their representations in the drawings.

- Complete the checklist based on their analysis.
6. **Group Discussion:** After a set time, gather the groups and facilitate a discussion. Each group can present their findings, highlighting potential problems they identified, the corrective measures they would recommend, and how each issue could impact the formwork setup.
 7. **Feedback and Reflection:** Lead a debriefing session by providing feedback on the groups' analyses and encouraging further discussion on the importance of each pre-erection check. Ask questions to prompt reflection on the critical role of these checks in construction safety and efficiency.
 8. **Application:** Conclude the activity by discussing real-life scenarios where pre-erection checks have averted construction mishaps. Emphasize how these checks can contribute to successful formwork projects.
 9. **Key Learning Points:** This activity helps learners reinforce their understanding of reading schematic working drawings, identifying potential issues in formwork setups, and comprehending the significance of pre-erection checks in ensuring the safety and quality of construction projects. It promotes critical thinking, collaboration, and practical application of theoretical knowledge.

Activity -2



- **Objective:** To engage students in understanding different types of system formwork used in construction, their components, and advantages through hands-on exploration and group discussion.
- **Materials Needed:**
 - ◆ Pictures or models representing Aluminum, MIVAN, Steel, Doka, and PERI system formwork
 - ◆ Labels or brief descriptions of each system
 - ◆ Paper, markers, and pens
 - ◆ Whiteboard and markers for group discussion
- **Instructions:**
 - ◆ **Introduction:** Begin by discussing the concept of system formwork and its advantages over conventional formwork. Mention that system formwork utilizes different materials and methods for construction, leading to increased efficiency and durability.
 - ◆ **Exploration Stations:** Set up different exploration stations for each type of system formwork. Place pictures or models of Aluminum, MIVAN, Steel, Doka, and PERI formwork at separate stations. Provide labels or descriptions for each system. Divide students into small groups and assign each group to a specific station.
 - ◆ **Exploration and Note-taking:** In their groups, students will rotate through each station, closely examining the pictures or models and reading the provided labels or descriptions. Encourage them to take notes about the distinctive features, components, and advantages of each system.

- ◆ **Group Discussion:** Bring all students together and facilitate a group discussion using the whiteboard. Ask each group to present their findings about the system formwork they explored. Discuss the unique features, components, and advantages of each type.
 - ◆ **Advantages Brainstorm:** After discussing each type of system formwork, lead a brainstorming session. Ask students to collectively list the advantages of using system formwork compared to conventional formwork. Write down their responses on the whiteboard.
 - ◆ **Comparison Chart:** Distribute paper and markers to each group. Ask them to create a comparison chart that highlights the key differences between the Aluminum, MIVAN, Steel, Doka, and PERI system formwork types. Include categories such as materials, advantages, and typical applications.
 - ◆ **Group Presentations:** Each group will present their comparison charts to the class. This will help reinforce their understanding of the different system formwork types and their specific characteristics.
 - ◆ **Reflection:** Conclude the activity by discussing how understanding different types of system formwork can be valuable for future careers in construction. Emphasize the importance of choosing the appropriate formwork method based on project requirements.
- **Expected Outcome:** This activity engages students in a hands-on exploration of various system formwork types, encourages collaborative learning, and promotes critical thinking through comparison and analysis. Students will gain insights into the advantages and features of different system formwork methods, which will be valuable in real-world construction scenarios.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

UNIT 9.2: Assemble and Dismantle System Formwork

Unit Objectives

After the end of this unit, participants will be able to:

1. Demonstrate assembling of system formwork for R.C.C footing, column, wall, beam and slab.
2. Demonstrate methods to check the erected formwork for line, level, alignment and plumb within tolerance limit.
3. Demonstrate dismantling of system formwork for R.C.C footing, column, wall, beam and slab.
4. Show how to check the quality of formwork materials for reusability after dismantling.

Say

In this unit, we will learn about the process of assembling and dismantling system formwork used in construction projects. By the end of this unit, you will be equipped with the skills to effectively put together system formwork for various components such as R.C.C footing, column, wall, beam, and slab. Additionally, you will learn methods to ensure that the erected formwork aligns correctly, maintaining line, level, alignment, and plumb within specified tolerance limits. You will also master the technique of safely dismantling system formwork after its use, and understand how to assess the quality of formwork materials for potential reusability once dismantled.

Resources to be used

- Various types of system formwork components (such as panels, beams, props, wedges, connectors)
- Construction site or simulation area
- Safety equipment (hard hats, gloves, safety goggles, etc.)
- Measuring tools (tape measure, spirit level, plumb bob)
- Assembled formwork samples for demonstration
- Dismantled formwork samples for quality assessment
- Whiteboard and markers for explanations and diagrams

Ask

- How do you ensure that the erected formwork maintains accurate alignment, plumb, and adherence to specified tolerances?
- Can you elaborate on the significance of maintaining accurate formwork alignment and plumb in terms of the overall quality and integrity of the construction?

Elaborate



- Introduction and overview of resources.
- Pre-activity discussion and participant engagement.
- Practical demonstration of formwork assembly.
- Participants' hands-on formwork assembly.
- Discussion on alignment and construction quality.
- Demonstration of safe formwork dismantling.
- Participants' hands-on formwork dismantling.
- Explanation of formwork material assessment.
- Reflection and sharing insights.
- Conclusion highlighting practical skills acquired.

Activity -1



- Objective: To demonstrate and practice the systematic erection of formwork for footings and columns, ensuring stability, alignment, and proper assembly techniques.
- Materials Needed:
 - ◆ Mock foundation area (can be a cleared and leveled plot of ground)
 - ◆ Formwork panels (plywood sheets)
 - ◆ Supporting brackets
 - ◆ Steel walers
 - ◆ Waler connectors
 - ◆ Head adaptor assembly
 - ◆ Bit rods
 - ◆ Tie rods with wing nuts
 - ◆ Plumb bob
 - ◆ Hand tools (wrenches, spanners, etc.)
 - ◆ Releasing agent (oil or release agent spray)
 - ◆ Cover blocks
 - ◆ Measuring tape
 - ◆ Mason's rope

- ◆ Line thread
- ◆ Cotton chalk piece

Duration: 1 full day

- **Instructions:**

- **Introduction and Safety Briefing:** Begin the workshop with an introduction to the importance of proper formwork erection in construction projects. Emphasize safety precautions, proper tool usage, and the significance of following engineering drawings.
- **Understanding Drawings:** Explain how engineering drawings are essential for guiding formwork erection. Show participants the provided drawings for footing and column formwork, explaining the different components and measurements.
- **Setting Up Mock Foundation Area:** Mark out a mock foundation area on the ground. This area will serve as a practice space for assembling the formwork.

- **Erection of Formwork for Footing:**

- Demonstrate how to measure and check the size and slope of the pit using a measuring tape and mason's rope.
- Discuss the importance of collecting and organizing all required materials before starting.
- Show how to apply releasing agent properly on the formwork panels to facilitate easy removal after concreting.
- Guide participants through the step-by-step process of placing formwork panels, connecting walers, fixing lapping plates, and adding steel walers.
- Highlight the use of supporting bracket assemblies and head adaptor assemblies for stability.
- **Hands-on Practice for Footing Formwork:** Participants work in pairs or small groups to replicate the formwork erection process for the mock footing area. Provide guidance and assistance as needed.

- **Erection of Formwork for Column:**

- Explain the use of plywood sheets with battens and stiffeners for column shuttering.
- Describe the application of a release agent to the inner surfaces of shuttering materials for easy removal.
- Walk participants through the steps of erecting column formwork using L-shutter panels, supporting bracket assemblies, head adaptors, tie rods, and foot adaptors.
- Show how to use a plumb bob to ensure verticality.

1. **Hands-on Practice for Column Formwork:** Participants practice erecting column formwork on mock column starter structures. Monitor their progress and provide feedback.

2. **Discussion and Q&A:** Gather participants for a discussion on challenges faced during the practice sessions. Address any questions and clarify doubts related to formwork erection.
 3. **Review and Closing:** Summarize the key points of the workshop, highlighting the importance of proper formwork erection techniques for construction safety and quality. Provide participants with resources for further reading.
- **Benefits:**
 - Participants gain hands-on experience in assembling formwork for footings and columns.
 - They understand the significance of engineering drawings, material preparation, and safety measures.
 - Participants learn about various formwork components and their interconnections.
 - The workshop promotes teamwork and problem-solving skills among participants.

Activity -2



- **Objective:** To simulate the process of erecting formwork for a wall, allowing participants to practice the steps involved and understand the importance of proper formwork assembly.
- **Materials Needed:**
 - ◆ Simulated wall starter (could be a wooden structure representing the wall's starting point)
 - ◆ Simulated formwork panels (plywood sheets)
 - ◆ Supporting brackets (wooden blocks)
 - ◆ Steel walers (wooden planks)
 - ◆ Head adaptors (wooden blocks)
 - ◆ Bit rods (wooden dowels)
 - ◆ Tie rods with wing nuts (wooden dowels and nuts)
 - ◆ Plumb bob (string with a weight)
 - ◆ Releasing agent (water spray bottle)
 - ◆ Measuring tape
 - ◆ Line thread
 - ◆ Cotton chalk piece (for marking)
- **Duration:** 2 hours
- **Instructions:**
 - ◆ **Introduction and Safety Briefing:** Begin the simulation by introducing the participants to the

importance of proper formwork erection and safety precautions.

- ◆ **Understanding Drawings:** Show the participants the provided wall formwork drawing. Explain the different components and measurements involved in the process.
- ◆ **Setting Up Simulation Area:** Set up the simulated wall starter area where participants can practice assembling the formwork.
- **Erection of Formwork for Wall:**
 - Explain the need for a releasing agent and demonstrate how to apply it on the formwork panels.
 - Show participants how to follow the approved drawing for erecting wall formwork.
 - Discuss the importance of collecting all materials before starting the assembly.
- **Step-by-Step Simulation:**
 - Participants work in pairs or small groups to replicate the formwork erection process on the simulated wall starter.
 - **Walk participants through each step:** placing the wall shutter, adding supporting brackets, connecting steel walers, fixing head adaptors, and inserting tie rods.
 - Emphasize the use of a plumb bob to ensure verticality and alignment.
 - **Hands-on Practice:** Participants practice the simulation, taking turns to perform different steps of the formwork erection process.
 - **Discussion and Clarification:** Gather participants to discuss their experience during the simulation. Address any questions and clarify doubts related to the process.
 - **Review and Conclusion:** Summarize the key points covered during the simulation, emphasizing the significance of proper formwork assembly techniques.
- **Expected Outcome:**
 - Participants gain practical experience in assembling formwork for walls.
 - They understand the importance of drawings, material preparation, and safety precautions.
 - Participants learn about various formwork components and their interconnections.
 - The simulation promotes teamwork and problem-solving skills among participants.

Activity -3



- **Objective:** To provide hands-on experience in dismantling concrete formwork for walls, columns, beams, and slabs while adhering to safety practices and emphasizing the importance of careful handling.
- **Materials Needed:**
 - ◆ Actual formwork panels (plywood or other materials)
 - ◆ Panel puller tool
 - ◆ Nuts and bolts
 - ◆ Wall support structures (if available)
 - ◆ Waler (if available)
 - ◆ Form release agent (spray bottle)
 - ◆ Safety equipment (hard hats, gloves, safety glasses)
 - ◆ Markers (for numbering and color coding)
 - ◆ Workspace with constructed concrete structures
- **Duration:** Half-day or full-day event, depending on the complexity of structures
- **Instructions:**
 - Introduction and Safety Briefing: Begin with an overview of the workshop's purpose, emphasizing safety as a top priority throughout the activity.
 - Understanding Concrete Strength: Explain the concept that formwork dismantling should only be done after the concrete has gained sufficient strength. Discuss how concrete strength affects the timing of dismantling.
- **Guided Dismantling Sessions:**
 - ◆ Divide participants into small groups based on the number of available structures (walls, columns, beams, slabs).
 - ◆ Assign each group to a specific type of structure.
 - ◆ Provide participants with the necessary tools, including panel puller tools, nuts and bolts, and form release agent.
- **Dismantling Process:**
 - ◆ Each group should follow the steps mentioned in the provided content for dismantling the assigned structure type.
 - ◆ Emphasize the systematic removal of formwork components, starting with supports, nuts, walers, and then the panels.
 - ◆ Demonstrate the proper use of the panel puller tool to prevent damage to the concrete surface.

- **Safety Measures:**
 - ◆ Remind participants to always wear safety equipment during the dismantling process.
 - ◆ Encourage communication and teamwork to ensure everyone's safety.
- **Numbering and Color Coding:**
 - ◆ Explain the importance of numbering and color coding for identifying formwork panels during reassembly.
 - ◆ Provide markers for Form Release Agent Application participants to number and mark the panels they remove.
- **Form Release Agent Application:**
 - ◆ Demonstrate how to apply the form release agent to protect the formwork panels for future use.
 - ◆ Participants should apply the release agent on the panels they have dismantled.
- **Hands-on Practice:**
 - ◆ Allow participants to work in pairs or small groups to dismantle formwork panels.
 - ◆ Supervise and assist as needed, providing guidance on technique and safety.
- **Discussion and Sharing:**
 - ◆ Gather participants to discuss their experiences during the dismantling process.
 - ◆ Encourage sharing of any challenges faced and lessons learned.
- **Cleanup and Conclusion:**
 - ◆ Ensure that all dismantled components are properly stored and organized.

Summarize the workshop, emphasizing safety practices, systematic dismantling, and the importance of preserving formwork.

Benefits:

- Participants gain practical experience in dismantling actual formwork components.
- They learn about the timing considerations and systematic approach for formwork removal.
- The workshop promotes teamwork, communication, and problem-solving skills.
- Participants understand the significance of safety measures and proper handling techniques.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do



- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation



- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Notes



A large rectangular area enclosed by an orange border, containing 26 horizontal black lines for writing notes.

UNIT 9.3: Assembling and Dismantling Of Aluminum Formwork

Unit Objectives

After the end of this unit, participants will be able to:

1. Discuss the standard procedure for assembling and dismantling of system formwork for R.C.C footing, column, wall, beam, slab.

Say

In this unit we will discuss and execute the standard procedures for assembling and dismantling system formwork in reinforced concrete construction for footings, columns, walls, beams, and slabs. Whether you're a construction professional or simply curious about the topic, this unit will empower you with essential skills for efficient and safe construction practices.

Resources to be used

- Visual Aids (e.g., diagrams, illustrations, slides)
- Physical or Virtual Mock-up Components (optional)
- Safety Equipment (optional, including helmets, gloves, and safety glasses)
- Reference Materials (e.g., formwork manuals, textbooks)
- Presentation Tools (e.g., projector, screen)
- Suitable Space (if conducting practical demonstrations)

Ask

- What are the key safety considerations when assembling or dismantling formwork in reinforced concrete construction?
- How does the assembly process differ for different structural components like columns and slabs?

Elaborate

- Introduction and overview of resources.
- Standard procedure for assembling and dismantling of system formwork for R.C.C footing, column, wall, beam, slab.

Let us do an activity to understand the above topics.

Activity

- **Objective:** In this activity, learners will understand the process of assembling and dismantling aluminum formwork for construction purposes. Aluminum formwork is a versatile system used in building construction.
- **Materials Needed:**
 - Visual aids or diagrams representing aluminum formwork components.
 - Physical or virtual mock-up components (if available).
 - Safety equipment (optional).
- **Duration:** Approximately 30-45 minutes
- **Instructions:**
- **Introduction (5 minutes):**
 - Begin by explaining the importance of aluminum formwork in construction and its advantages (durability, speed, reusability).
 - Present the key components of aluminum formwork: panels, pins, wedges, wall ties, beams, and props.
 - Highlight the safety precautions for working with formwork.
- **Activity Steps:**
 - Step 1: Applying Release Agent**
Show a visual aid of formwork panels.
 - Explain the need for applying a release agent to the panels.
 - Discuss the importance of Fig 9.3.1 in this step.
 - Step 2: Fixing Outer Corner**
 - Show a visual aid of an external wall corner panel.
 - Demonstrate how to fix the outer corner using round pins and wedges.
 - Use Fig 9.3.2 to explain the process.
 - Step 3: Fixing Inner Corner and Wall Panels**
 - Display images of internal and external wall panels.
 - Explain how to fix inner corners using round pins and wedges.
 - Mention the use of wall ties and tie bar shields.
 - Use Fig 9.3.3 to illustrate the process.

Step 4: Assembly of Wall Panels (5 minutes)

- Show the assembly of wall panels using Fig 9.3.4.
- Emphasize the repetition of Step 3 for completing wall assembly.

Step 5: Installing Slab Corner (5 minutes)

- Display the installation of slab corners using round pins and wedges.
- Use Fig 9.3.5 to explain the process.

Step 6: Combining Beams and Props

- Explain how beams, props, and beam splice bars are combined using long pins and wedges.
- Utilize Fig 9.3.6 to illustrate beam propping.

Step 7: Assembling Slab Panels

- Describe the process of assembling slab panels from the slab corner internally.
- Mention the use of Aluspans.
- Refer to Fig 9.3.7 for clarity.

Step 8: Adding Wall Panels or Kickers

- Explain the addition of wall panels or kickers to raise the height for concrete containment.
- Use Fig 9.3.8 to visualize this step.

Step 9: Marking and Coding (5 minutes)

- Discuss the importance of marking panels for future use.
- Explain the use of color coding or numbering.
- Mention Fig 9.3.9 as a reference.

• Conclusion:

- Summarize the key steps in assembling aluminum formwork.
- Discuss the importance of safety and quality control during assembly.
- Mention the need for proper concrete distribution in the forms.

• Questions and Discussion :

- Open the floor for questions and clarify any doubts.
- Discuss real-world applications of aluminum formwork in construction projects.

• Optional Practical Demonstration (if available):

- If physical aluminum formwork components are available, allow learners to assemble and

disassemble a small mock-up.

- Emphasize safety while handling formwork materials.
- **Expected Outcome:** By following this activity, learners will gain a comprehensive understanding of the process of assembling and dismantling aluminum formwork in construction projects.

Do



- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation



- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Notes



A large rectangular area enclosed by an orange border, containing 30 horizontal black lines for writing notes.

UNIT 9.4: Stripping Time of Formwork

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain the importance of stripping time for removing shuttering of various R.C.C structural elements.

Say

Today, we are delving into a critical aspect of reinforced concrete construction, one that can significantly impact the quality and integrity of our structures. The importance of stripping time for the removal of shuttering or formwork from various R.C.C (Reinforced Concrete Construction) structural elements will be explained. This concept is key to ensuring the success of our construction projects and the safety and durability of our structures. So, let's dive right in and discover why stripping time is considered a vital consideration in the construction process.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about the process and practices involved with stripping time of RCC.

Ask

- How does the choice of stripping time impact the structural integrity and surface finish of R.C.C elements like columns and slabs?
- Can you provide examples of specific construction scenarios where adjusting stripping time can lead to better outcomes in terms of both efficiency and quality?

Elaborate

- Introduction and overview of resources.
- importance of stripping time for removing shuttering of various R.C.C structural elements.

Let us do an activity to understand the above topics.

Activity



- **Topic:** “Stripping Time of Formwork” Demonstration
- **Objective:** To help learners understand the concept of stripping time in concrete construction and its importance.
- **Materials Needed:**
 - A small-scale concrete model or diagram representing a structural element with formwork.
 - Visual aids or slides illustrating the concept of stripping time.
 - Labels or markers.
- **Duration:** Approximately 30 minutes
- **Instructions:**
 - Begin by explaining the concept of stripping time in concrete construction – the time period that must elapse before formwork can be safely removed.
 - Highlight the significance of stripping time in ensuring the quality and integrity of the concrete structure.
- **Demonstration:**
 - Display the small-scale concrete model or diagram representing a structural element (e.g., a slab).
 - Show visual aids or slides explaining the recommended stripping times for different types of formworks as per IS 456: 2000 (use the provided table).
 - Discuss the variations in stripping time when using aluminum formwork.
 - Emphasize the importance of preventing damage to concrete and formwork during the stripping process.
- **Activity:**
 - Divide learners into small groups.
 - Provide each group with a label or marker.
 - Instruct each group to discuss and decide the appropriate stripping time for a specific type of formwork (e.g., vertical formwork for a column).
 - Ask each group to label the model or diagram with their chosen stripping time.
 - Have each group explain their choice and reasoning to the class.
- **Conclusion and Discussion:**
 - Summarize the key points about stripping time and its significance in concrete construction.

- Encourage a class discussion on the challenges and considerations when determining the stripping time for different formwork types.
- Highlight the role of supervision and quality control during the stripping process.
- **Learning Outcome:** By engaging in this hands-on activity, learners will gain a practical understanding of the importance of stripping time in concrete construction and how it varies for different types of formworks. This interactive approach enhances comprehension and retention of the topic.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

UNIT 9.5: Repair of Shutter Panels

Unit Objectives

After the end of this unit, participants will be able to:

1. Describe the procedure for repairing the formwork.
2. Discuss the use of lifting gears for shifting and fixing of formwork components.
3. Explain the standard procedure for stacking and storing of formwork components.
4. Demonstrate stacking of formwork components.

Say

In Unit 9.5, “Repair of Shutter Panels,” we have practical objectives. You’ll learn formwork repair procedures, master safe lifting gear use, understand formwork stacking guidelines, and demonstrate correct stacking practices. This unit equips you with essential skills for effective formwork management in construction.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about the repair of shutter panels.

Ask

- What are the key reasons for prioritizing the repair of formwork panels in construction projects, and how does it impact project outcomes?
- Can you describe the primary safety considerations when using lifting gear for shifting and securing formwork components, and how do they contribute to a successful construction process?

Elaborate

- Introduction and overview of resources.
- Procedure for repairing the formwork.
- Use of lifting gears for shifting and fixing of formwork components.

- Standard procedure for stacking and storing of formwork components.
- Stacking of formwork components.

Let us do an activity to understand the above topics.

Activity

- **Objective:** To provide hands-on experience and practical knowledge of repairing damaged shutter panels using various methods.
- **Materials Needed:**
 - Damaged shutter panels or simulated damaged panels (plywood or similar material).
 - Wooden battens and nails.
 - Paint scraper.
 - Pliers or nail remover machine.
 - Planer machine.
 - Cylindrical head drill bit.
 - Wooden discs.
 - Putty or wooden filler.
 - Safety equipment (safety glasses, gloves, ear protection).
 - Tools (hammers, drills, etc.).
 - Worktables and workspaces.
- **Duration:** Half-day workshop (3-4 hours)
- **Instructions:**
- **Introduction:**
 - Begin by explaining the importance of repairing damaged shutter panels to extend their lifespan and reduce construction costs.
 - Discuss the common causes of damage to formwork panels, such as vibrator pressure during concreting and impacts during assembly and dismantling.
- **Nailing Method Demonstration:**
 - Demonstrate the nailing method for repairing damaged panels using a pre-damaged panel or simulated damaged panel.
 - Show how to identify the area in need of repair and evaluate whether a wooden batten will

provide sufficient support.

- Walk participants through the steps of cutting a wooden bar, placing it below the damaged area, and hammering nails to secure the panel to the batten.
- Emphasize the importance of checking the evenness and suitability of the repaired panel for further use.
- **Other Repair Methods Demonstration:**
 - Explain the alternative methods for repairing damaged panels, such as removing paint, removing nails, leveling the surface, and filling holes or cracks.
 - Demonstrate these steps using the appropriate tools and materials.
 - Showcase the use of cylindrical head drill bits and wooden discs for repairing damaged spots.
 - Highlight the use of putty or wooden filler to repair large holes or cracks.
- **Hands-On Repair Practice:**
 - Divide participants into smaller groups and provide each group with a damaged or simulated damaged shutter panel.
 - Assign specific repair methods (e.g., nailing, paint removal, nail removal, leveling, hole filling) to each group.
 - Encourage participants to work together to repair their panels using the assigned methods.
 - Provide guidance, supervision, and assistance as needed.
- **Conclusion and Discussion:**
 - Gather participants for a group discussion.
 - Reflect on the repair methods demonstrated and practiced during the workshop.
 - Discuss the importance of regular maintenance and repair of formwork components on construction sites.
 - Address any questions or concerns from participants.
- **Learning Outcome:** By engaging in this hands-on workshop, participants will gain practical skills in repairing damaged shutter panels using various methods, ensuring they are better prepared for real-world construction scenarios.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do



- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation



- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

UNIT 9.6: Stacking and Storing of Formwork Panels

Unit Objectives

After the end of this unit, participants will be able to:

1. Know about stacking and storing of formwork panels

Say

In Unit 9.6, “Stacking and Storing of Formwork Panels,” our sole objective is to equip you with a thorough understanding of the methods and principles associated with stacking and storing formwork panels. This knowledge is vital for efficient and safe formwork management on construction sites. By the end of this unit, you’ll be well-prepared to ensure that formwork panels are handled and stored effectively, contributing to the success of construction projects. Let’s delve into the essential practices of formwork panel management.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about the stacking and storing panels.

Ask

- How does the proper stacking and storing of formwork panels contribute to the overall efficiency and safety of construction projects?
- What are some key considerations and best practices to keep in mind when handling and storing formwork panels on a construction site?

Elaborate

- Introduction and overview of resources.
- Stacking and Storing of formwork panels.

Let us do an activity to understand the above topics.

Activity

- **Objective:** To help learners understand the proper techniques for stacking and storing formwork panels and reinforce key do's and don'ts.
- **Materials Needed:**
 - Actual formwork panels (if available).
 - Pictures or illustrations of formwork panels (if actual panels are not available).
 - A checklist of do's and don'ts (based on the provided content).
 - Work area with available space for inspecting and discussing formwork stacking and storing.
- **Duration:** 1-2 hours
- **Instructions:**
- **Introduction:**
 - Explain the importance of proper stacking and storing of formwork panels in construction projects.
 - Emphasize the need for safety, organization, and material preservation during the process.
 - Introduce the key do's and don'ts associated with formwork handling and storage.
- **Inspection and Discussion:**
 - Divide participants into small groups.
 - Provide each group with actual formwork panels or pictures/illustrations.
 - Instruct each group to inspect the panels and discuss whether they are stacked and stored correctly, following the do's and don'ts provided.
 - Encourage participants to identify any issues, such as damage, improper stacking, or violations of safety guidelines.
 - Use the checklist to guide the inspection process.
- **Group Discussion and Debrief:**
 - Gather participants for a group discussion.
 - Ask each group to share their findings and observations, including any issues or violations they identified.
 - Discuss the consequences of improper formwork stacking and storing.
 - Emphasize the importance of safety and material preservation in construction.
 - Review the key points and clarify any questions or doubts.

- **Conclusion:**
 - Conclude the activity by summarizing the critical aspects of formwork stacking and storing.
 - Encourage participants to apply their understanding of proper formwork handling in real construction scenarios to ensure efficiency, safety, and material longevity.
- **Expected Outcome:** By conducting this inspection-based activity, learners will gain practical experience in evaluating formwork stacking and storing techniques, reinforcing the importance of adhering to guidelines and safety measures in construction projects.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Exercise

Key Solutions to PHB Exercise

1. C. top, front, and right-side
2. B. dado
3. C. filling it with a sliver of wood
4. D. The cost of workmanship is more than other materials.
5. Formwork area for the beam = (Length x Width) + 2 x (Height x Width)

$$\text{Formwork area} = (6750 \text{ mm} \times 250 \text{ mm}) + 2 \times (650 \text{ mm} \times 250 \text{ mm})$$

$$\text{Formwork area} = 1,687,500 \text{ square millimeters or } 1.6875 \text{ square meters.}$$

6. To calculate the formwork area for the slab, you need the dimensions (length and width) of the slab.

To calculate the formwork area for the given slab, we can break it down into two rectangular sections: RB1 (reinforcement bar 1) and RB2 (reinforcement bar 2). We'll calculate the area of each section separately and then add them together.

RB1:

$$\text{Length (L1)} = 250 \text{ mm}$$

$$\text{Width (W1)} = 600 \text{ mm}$$

$$\text{Area of RB1} = \text{L1} \times \text{W1} = 250 \text{ mm} \times 600 \text{ mm} = 150,000 \text{ square millimeters}$$

RB2:

$$\text{Length (L2)} = 150 \text{ mm}$$

$$\text{Width (W2)} = 450 \text{ mm}$$

$$\text{Area of RB2} = \text{L2} \times \text{W2} = 150 \text{ mm} \times 450 \text{ mm} = 67,500 \text{ square millimeters}$$

Now, let's calculate the formwork area for the entire slab, considering the clear spans:

$$\text{Clear Span 1} = 7650 \text{ mm}$$

$$\text{Clear Span 2} = 3650 \text{ mm}$$

Since the slab consists of two rectangular sections (RB1 and RB2) with different dimensions, we'll calculate the formwork area for each section and then add them together:

$$\text{Formwork Area for RB1} = \text{Area of RB1} \times \text{Clear Span 1}$$

$$\text{Formwork Area for RB2} = \text{Area of RB2} \times \text{Clear Span 2}$$

$$\text{Formwork Area for RB1} = 150,000 \text{ sq mm} \times 7650 \text{ mm} = 1,147,500,000 \text{ square millimeters}$$

Formwork Area for RB2 = $67,500 \text{ sq mm} \times 3650 \text{ mm} = 246,375,000$ square millimeters

Now, add the areas of RB1 and RB2 together to find the total formwork area for the given slab:

Total Formwork Area = Formwork Area for RB1 + Formwork Area for RB2

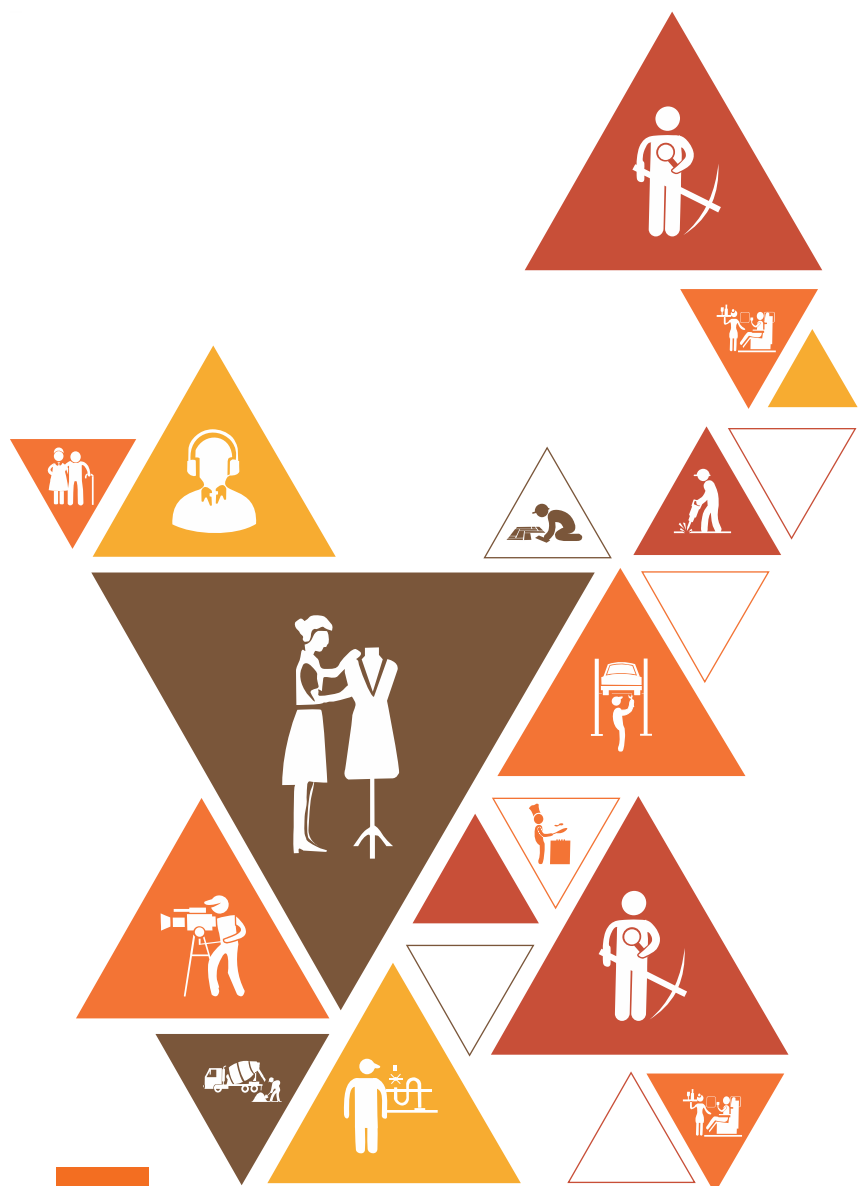
Total Formwork Area = $1,147,500,000 \text{ sq mm} + 246,375,000 \text{ sq mm} = 1,393,875,000$ square millimeters

So, the total formwork area for the given slab is approximately 1,393,875,000 square millimeters.

7. A. Mivan
8. Erecting formwork for columns involves setting up vertical molds around the column's perimeter, ensuring proper alignment, and securing the formwork in place before pouring concrete.
9. When erecting formwork for beams, consider proper bracing, alignment, and leveling. Ensure that the formwork can support the weight of the concrete and reinforcing steel. Check for any obstructions or protrusions that may affect the formwork.
10. Side shuttering refers to the formwork or molds used to create the sides or vertical surfaces of concrete structures, such as walls or columns. It is an essential component of the formwork system used in construction.
11. To take care of shuttering work while reusing it, you should ensure that the shuttering material is cleaned and free from any concrete or debris from previous use. Any damaged or worn-out parts should be repaired or replaced. Additionally, you should apply a release agent or form oil to the shuttering surface to facilitate easy removal of the concrete during the next use.
12. C. removes excess glue
13. C. Double faced pallets
14. A. Horizontally
15. A. Horizontally

Notes 

Lined area for taking notes, containing 26 horizontal lines.





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Transforming the skill landscape

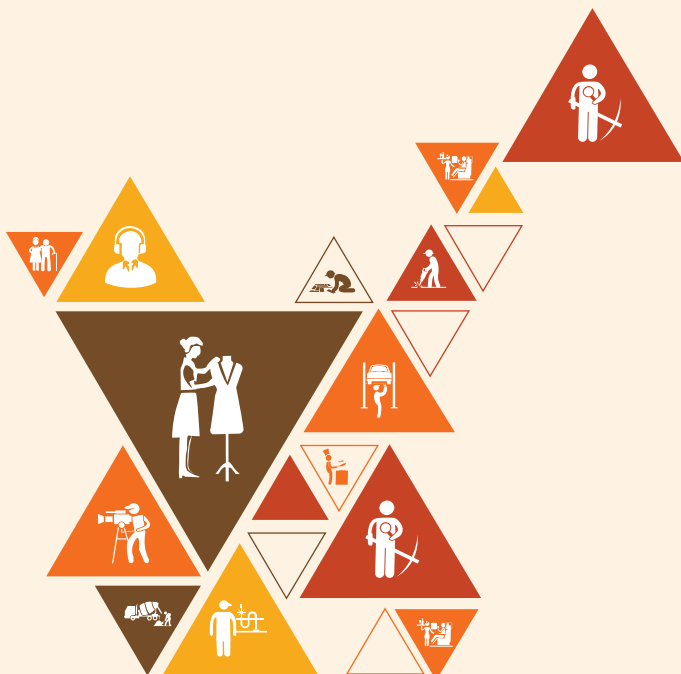


10. Assembling and dismantling conventional shuttering / formwork for RCC structures (Elective-2)

Unit 10.1 - Conventional Formwork

Unit 10.2 - Quality Checks and Assurance

Unit 10.3 - Erection and Dismantling



CON/N0315

Key Learning Outcomes

After the end of this module, participants will be able to:

1. Explain how to interpret sketches / schematic working drawing/ cutting plan relevant to shuttering work.
2. Discuss about conventional formworks.
3. Discuss the importance of handling of hand and power tools and their basic maintenance.
4. Discuss the defects in bamboo, ballies, timber and plywood etc.
5. Explain the application of different types of timber and non-timber materials used in different shuttering works.
6. Discuss the standard shape and size of carpentry tools.
7. Discuss the use different types of material used in conventional shuttering works.
8. Explain the importance of tying knots and different type of knots used for connection of bamboos and ballies.
9. Discuss the various components of the conventional formwork such as pipes, coupler, tying thread and other fixtures.
10. Discuss the sequential steps for erection and bracing of formwork, as per standard procedure.
11. Explain the method statement used for the erection of conventional staging using bamboo, ballies, pipe and coupler.
12. List the do's and don'ts applicable for erection of conventional staging either using bracings or bamboo and ballies or pipe and coupler.
13. Explain the importance of checks with respect to plumb, level and alignment for the formwork.
14. Discuss the different type of shuttering required for various structures with its applicable limits of tolerances.
15. Describe the procedure for positioning or attaching tie systems, soldiers and walling.
16. Explain the properties and method of application of release agents.
17. Explain the sequential step for dismantling of conventional formwork shutters.
18. Show how to perform check to ensure cleanliness of shutters, suitability of supporting base, availability of tools, availability of components, availability of fixtures prior to erection/use of conventional formwork.
19. Demonstrate the application of releasing agent to sheathing materials as per the specification.

20. Demonstrate how to position and strike box-outs and bolt boxes, grout checks, level controls, angle fillets and features
21. Show how to use the supports such as runner pieces, timber, props, tie systems appropriately for positioning and providing support.
22. Show how to provide the braces for formwork support as per the specification and requirement.
23. Show how to use form sheet or other appropriate packing material for ensuring the water tightness of form.
24. Demonstrate how to fix tie rods, supports, bracings after erection of formwork shutters.
25. Show how to perform checks for line, level and alignment of the erected formwork as per permissible tolerance limits.
26. Show how to perform checks for dimensional accuracy and right angle, and take necessary corrective action if required.
27. Demonstrate the standard procedure for dismantling of formwork shutters manually or by mechanical means as per the requirements
28. Show how to check the quality of formwork materials for reusability after dismantling.
29. Demonstrate proper storing, stacking and cleaning of formwork materials after dismantling

Unit 10.1: Conventional Formwork

Unit Objectives

After the end of this unit, participants will be able to:

1. Discuss about conventional formworks.
2. Discuss the defects in bamboo, ballies, timber, and plywood etc.
3. Explain the application of different types of timber and non-timber materials used in different shuttering works.
4. Discuss the various components of conventional formwork such as pipes, coupler, tying thread, and other fixtures.
5. Explain the method statement used for the erection of conventional staging using bamboo, ballies, pipe, and coupler.
6. Discuss the sequential steps for erection and bracing of formwork, as per standard procedure.
7. Discuss the standard shape and size of carpentry tools.
8. Discuss the use of different types of material used in conventional shuttering works.
9. Explain the importance of tying knots and different types of knots used for connection of bamboos and ballies.
10. List the do's and don'ts applicable for erection of conventional staging either using bracings or bamboo and ballies or pipe and coupler.

Say

In this lesson on Conventional Formwork, we'll cover its fundamentals, defects in materials like bamboo and timber, application of different materials, components (pipes, couplers, etc.), erection methods, tool specifications, material usage, knot tying, and essential do's and don'ts for safe construction practices. This comprehensive overview will equip you with valuable knowledge and skills for effective formwork construction.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about Conventional formwork.

Ask

- Can you name one common defect that might occur in bamboo when used in conventional formwork, and how would you address it?
- What are the key components of a conventional formwork system, and why is the proper assembly and bracing of these components crucial for a construction project?

Elaborate

- Introduction and overview of resources.
- Conventional formworks.
- Defects in bamboo, ballies, timber, and plywood etc.
- Components of conventional formwork.
- Conventional staging using bamboo, ballies, pipe, and coupler.
- Standard shape and size of carpentry tools.
- Material used in conventional shuttering works.
- Different types of knots used for connection of bamboos and ballies.
- Do's and don'ts applicable for erection of conventional staging

Let us do an activity to understand the above topics.

Activity-1

- **Objective:** To understand the characteristics and defects of different formwork materials and their suitability for specific construction applications.
- **Instructions:**
 - Divide the participants into small groups.
 - Provide each group with information about one formwork material: bamboo, timber, ballies, or plywood. Also, assign each group a non-timber material: steel/formwork systems, plastic/formwork panels, aluminum/formwork systems, or fiber-reinforced plastic (FRP).
 - Instruct each group to study the provided information about their assigned formwork material, including its common defects and applications.
 - Ask each group to discuss the advantages and disadvantages of their assigned materials based on the information provided.

- Have each group create a short presentation highlighting the key points about their assigned formwork material, focusing on its defects and applications.
- After the presentations, facilitate a discussion among all groups to compare and contrast the materials, discussing which ones are more suitable for specific construction scenarios and why.
- Conclude the activity by emphasizing the importance of selecting the right formwork material based on the project's requirements to ensure safety, quality, and efficiency in construction.
- **Expected Outcome:** This activity encourages participants to actively engage with the information presented, promotes critical thinking about material selection, and fosters a deeper understanding of the challenges and advantages associated with different formwork materials in construction.

Activity-2



- **Objective:** To familiarize participants with the various components used in conventional formwork systems through a hands-on and interactive puzzle activity.
- **Materials Needed:**
 - Printed images of the formwork components mentioned in the content.
 - Large poster board or wall space to assemble the puzzle.
 - Scissors and glue or tape.
- **Instructions:**
 - Before the activity, print out images of the formwork components listed in the content. Ensure that each component is on a separate piece of paper and labeled with its name.
 - Divide the participants into small groups.
 - Provide each group with a set of printed formwork component images, scissors, and glue or tape.
 - Explain the objective: Each group is tasked with assembling a “Formwork Component Puzzle” on the provided poster board or wall space. The puzzle should correctly match each component’s image with its name and description.
 - Set a time limit (e.g., 20-30 minutes) for the groups to complete the puzzle.
 - Encourage the groups to work together to identify the components, read their descriptions, and arrange them on the poster board in the correct order.
 - After the time limit, gather all the groups and review their completed puzzles. Discuss any

challenges or questions that arose during the activity.

- Facilitate a brief discussion about the importance of these formwork components in construction and how they contribute to the stability and quality of concrete structures.
- Conclude by emphasizing the need for proper knowledge and utilization of these components in real-world construction scenarios.
- **Expected Outcome:** This activity promotes teamwork, engages participants in active learning, and reinforces their understanding of the key components used in conventional formwork systems.

Activity-3



- **Topic Name:** Traditional Staging Assembly Simulation
- **Objective:** To simulate the process of assembling traditional staging using bamboo, balleys, pipes, and couplers, allowing participants to understand the practical steps involved.
- **Materials Needed:**
 - Bamboo poles (or substitutes such as dowel rods)
 - Wooden beams (as balleys)
 - Lightweight pipes (e.g., PVC or cardboard tubes)
 - Couplers or connectors (small clips or adhesive putty)
 - Ropes or strings
 - Open space or tabletop for assembly
 - Printed or visual reference of the steps for staging assembly (from Table 10.1.1)
- **Instructions:**
 - Begin by explaining the purpose of the activity: Participants will simulate the assembly of traditional staging using miniature materials.
 - Divide the participants into small groups and provide each group with the necessary materials, including bamboo poles (or substitutes), wooden beams (as balleys), lightweight pipes, couplers (or connectors), and ropes or strings.
 - Display or distribute a printed or visual reference of the steps for staging assembly (from Table 10.1.1) to each group.
 - Instruct each group to follow the steps provided in the reference to assemble their miniature traditional staging on the tabletop or within the designated open space.
 - Encourage participants to discuss and plan their assembly strategy, considering the roles of

bamboo poles, balleys, pipes, couplers, and ropes in the process.

- Emphasize the importance of teamwork, precision, and safety during the assembly.
- Set a time limit (e.g., 20-30 minutes) for each group to complete their traditional staging assembly.
- After the assembly time is up, have each group present their completed staging to the rest of the participants. They should explain their approach, highlight key components, and discuss any challenges they encountered.
- Facilitate a group discussion to compare and contrast the various approaches, focusing on the effectiveness of each group's assembly.
- Conclude the activity with a reflection on the importance of proper staging assembly in construction and maintenance work, highlighting the significance of teamwork, planning, and attention to detail.
- **Expected Outcome:** This activity provides participants with a hands-on experience of assembling traditional staging, reinforcing the procedural steps and teamwork required in real-world construction scenarios.

Activity-4



- **Topic:** Knot Tying Challenge
- **Objective:** To introduce participants to different types of knots used in construction, focusing on their applications and practicality.
- **Materials Needed:**
 - Ropes or cords of different diameters
 - Bamboo poles or dowel rods (to represent balleys)
 - Printed images or descriptions of the knots mentioned in the content
- **Instructions:**
 - Start by briefly introducing the importance of knots in construction, especially when connecting bamboo and balleys.
 - Display or distribute printed images or descriptions of the knots mentioned in the content, including the Square Knot, Clove Hitch, Round Turn and Two Half Hitches, Bowline, Timber Hitch, Sheet Bend, Square Lashing, and Diagonal Lashing.
 - Divide the participants into pairs or small groups, and provide each group with ropes or cords of various diameters and bamboo poles or dowel rods.
 - Instruct each group to choose one type of knot from the list and replicate it using the

provided materials. Encourage them to refer to the printed images or descriptions for guidance.

- Once the groups have successfully tied their chosen knots, ask them to discuss the practical applications of that specific knot in construction, particularly when connecting bamboo and balleys.
- Rotate the groups, allowing each to choose a different knot and repeat the tying and discussion process.
- Facilitate a group discussion where each group shares their chosen knot, its applications, and any insights gained from the activity.
- Conclude the activity by summarizing the key points related to knots and their significance in construction. Emphasize the importance of selecting the right knot for the task at hand.
- **Expected Outcome:** This hands-on activity engages participants in actively tying knots and encourages discussions about their real-world applications in construction, helping them understand the practicality of different knot types.

Activity-5



- **Topic Name:** “Safety in Construction - Do’s and Don’ts”
- **Objective:** To engage participants in a presentation activity that reinforces the importance of safety in construction by discussing the do’s and don’ts applicable to construction sites.
- **Materials Needed:**
 - Projector and screen (optional)
 - Presentation slides (prepared in advance, covering construction safety do’s and don’ts)
 - Whiteboard and markers (alternative to slides)
 - Safety gear (hard hats, safety vests, etc.)
- **Instructions:**
 - Divide the participants into small groups.
 - Provide each group with a specific construction safety topic from the do’s and don’ts list (e.g., scaffolding safety, fall protection, equipment operation, personal protective equipment).
 - Instruct each group to prepare a brief presentation on their assigned safety topic. They should create either presentation slides or write key points on the whiteboard.
 - Each presentation should include the following:

- An introduction to the safety topic.
- A list of the key “do’s” for that topic.
- A list of the key “don’ts” for that topic.
- Real-world examples or scenarios illustrating both correct and incorrect practices.
- Recommendations or tips for maintaining a safe construction site.
- Encourage participants to be creative in their presentations and consider using visuals, real-life stories, or demonstrations to convey their points effectively.
- Provide time for each group to prepare their presentations (around 20-30 minutes).
- After the preparation time, have each group present their safety topic to the entire group. If available, use a projector for presentations, or use the whiteboard for drawing diagrams or listing key points.
- Encourage audience engagement by allowing questions and discussions after each presentation.
- Emphasize the importance of safety in construction and how adhering to the do’s and avoiding the don’ts can prevent accidents and injuries.
- Conclude the activity by summarizing the key takeaways regarding construction safety and the do’s and don’ts discussed in the presentations.
- **Expected Outcome:** This presentation activity not only reinforces the importance of construction safety but also encourages participants to actively research and communicate safety guidelines, making it an effective and engaging learning experience.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Notes



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Unit 10.2: Quality Checks and Assurance

Unit Objectives

After the end of this unit, participants will be able to:

1. Explain the importance of checks with respect to plumb, level, and alignment for the formwork.
2. Discuss the different types of shuttering required for various structures with its applicable limits of tolerances.
3. Describe the procedure for positioning or attaching tie systems, soldiers, and walling.
4. Show how to perform checks to ensure cleanliness of shutters, suitability of supporting base, availability of tools, availability of components, availability of fixtures prior to erection/use of conventional formwork.
5. Demonstrate the application of releasing agent to sheathing materials as per the specification.
6. Demonstrate how to position and strike box-outs and bolt boxes, grout checks, level controls, angle fillets, and features.

Say

In this lesson on Conventional Formwork, we'll cover its fundamentals, defects in materials like bamboo and timber, application of different materials, components (pipes, couplers, etc.), erection methods, tool specifications, material usage, knot tying, and essential do's and don'ts for safe construction practices. This comprehensive overview will equip you with valuable knowledge and skills for effective formwork construction.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about Conventional formwork.

Ask

- Can you name one common defect that might occur in bamboo when used in conventional formwork, and how would you address it?
- What are the key components of a conventional formwork system, and why is the proper assembly and bracing of these components crucial for a construction project?

Elaborate

- Introduction and overview of resources.
- Checking plumb, level, and alignment for the formwork.
- Different types of shuttering required for various structures with its applicable limits of tolerances.
- Procedure for positioning or attaching tie systems, soldiers, and walling.
- Checks to ensure cleanliness of shutters, suitability of supporting base, availability of tools, availability of components, availability of fixtures prior to erection/use of conventional formwork.
- Application of releasing agent to sheathing materials as per the specification.
- Positioning and strike box-outs and bolt boxes, grout checks, level controls, angle fillets, and features.

Let us do an activity to understand the above topics.

Activity-1

Objective: To reinforce the importance of checks for plumb, level, and alignment in formwork while engaging participants in a hands-on activity.

- **Materials Needed:**
 - Wooden boards or panels (to represent formwork)
 - Plumb bob or level tools
 - Rulers or measuring tapes
 - Marking tools (e.g., chalk or tape)
 - Safety gear (hard hats, safety vests, etc.)
- **Instructions:**
 - Divide participants into small groups.
 - Provide each group with a set of wooden boards or panels, plumb bobs, level tools, rulers or measuring tapes, and marking tools.
 - Explain the objective: Each group will be responsible for setting up a section of formwork that represents a wall or column. The challenge is to ensure that their formwork is plumb, level, and aligned correctly.
 - Instruct each group to follow these steps:
 - Select a leader or team coordinator.

- Use the provided tools to measure and mark the desired dimensions for the formwork section on the wooden boards or panels.
- Work together to set up the formwork, making sure it is perfectly plumb (vertical), level (horizontal), and aligned according to the marked dimensions.
- Encourage participants to communicate and collaborate effectively within their groups to achieve the desired results.
- After each group has completed their formwork setup, conduct inspections to check for plumb, level, and alignment. Use plumb bobs, level tools, and measuring devices to verify the accuracy.
- Discuss the results as a group:
 - Emphasize the importance of plumb, level, and alignment in formwork and how they impact the quality and safety of concrete structures.
 - Encourage participants to share any challenges they faced during the activity and how they addressed them.
- Conclude the activity by highlighting the key takeaways regarding the significance of these checks in construction and their role in ensuring structural integrity and safety.
- **Expected Outcome:** This hands-on challenge allows participants to experience firsthand the importance of plumb, level, and alignment in formwork setup, reinforcing the concepts discussed in the content.

Activity-2

- **Objective:** To engage participants in a discussion-based activity that reinforces the procedure for positioning and attaching tie systems, soldiers, and walings in conventional formwork.
- **Instructions:**
 - Divide participants into small groups.
 - Provide each group with a printed copy of the procedure for positioning and attaching tie systems, soldiers, and walings in conventional formwork (the procedure you provided earlier).
 - Instruct each group to read and discuss the procedure together, ensuring they understand each step.
 - Assign a scenario to each group related to formwork setup. The scenarios can involve challenges or complications that may arise during the process. For example:
 - **Scenario 1:** “While positioning tie systems, you discover that some of the tie rods are slightly bent. How would you address this issue?”

- **Scenario 2:** “During the installation of soldiers, you realize that the formwork panels are not perfectly plumb. How would you rectify this?”
- **Scenario 3:** “The construction site experiences unexpected heavy rain while setting up the formwork. How would you adapt your procedure to ensure safety and stability?”
- **Scenario 4:** “You need to attach walings to an irregularly shaped formwork. How would you ensure proper alignment and support?”
- Encourage each group to discuss and brainstorm solutions for their assigned scenario while considering the procedure’s key principles.
- After a designated discussion time (e.g., 20-30 minutes), have each group present their scenario and the solutions they came up with to the entire group.
- Facilitate a group discussion after each presentation to analyze the proposed solutions, share insights, and discuss the importance of adaptability and problem-solving in formwork setup.
- Conclude the activity by summarizing the key takeaways regarding the procedure for positioning and attaching tie systems, soldiers, and walings, as well as the significance of being prepared for unexpected challenges on construction sites.
- **Expected Outcome:** This discussion-based activity allows participants to actively engage with the procedure and apply their problem-solving skills to real-world scenarios, reinforcing their understanding of formwork setup principles.

Activity-2



- **Objective:** To engage participants in a discussion-based activity that deepens their understanding of the procedure for positioning and striking construction elements.
- **Instructions:**
 - ◆ Divide participants into small groups.
 - ◆ Provide each group with a printed copy of the procedure for positioning and striking construction elements (the procedure you provided earlier).
 - ◆ Instruct each group to read and discuss the procedure together, ensuring they understand each step and its significance.
 - ◆ Assign each group a specific construction element or feature mentioned in the procedure (e.g., box-outs, grout checks, level controls, angle fillets).
 - ◆ Ask each group to:
 - Discuss the importance of the assigned construction element or feature in concrete work.
 - Share any challenges or considerations specific to their assigned element.

- Brainstorm scenarios where proper positioning and striking of their assigned element might be critical.
- Identify potential risks or issues that can arise if these elements are not positioned or struck correctly.
- ◆ Encourage participants to think critically and creatively about their assigned construction element and its role in ensuring accurate and successful concrete work.
- ◆ After a designated discussion time (e.g., 20-30 minutes), have each group present their findings and insights to the entire group.
- ◆ Facilitate a group discussion after each presentation to analyze the importance of each construction element and how their correct positioning and striking contribute to construction quality and accuracy.
- ◆ Conclude the activity by summarizing the key takeaways regarding the procedure for positioning and striking construction elements and the critical role these elements play in concrete work.
- **Expected Outcome:** This discussion-based activity allows participants to actively engage with the procedure and explore the significance of each construction element or feature in the context of concrete construction. It also encourages critical thinking and problem-solving related to construction processes.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Unit 10.3: Erection and Dismantling

Unit Objectives

After the end of this unit, participants will be able to:

1. Show how to use the supports such as runner pieces, timber, props, tie systems appropriately for positioning and providing support.
2. Show how to provide the braces for formwork support as per the specification and requirement.
3. Show how to use form sheet or other appropriate packing material for ensuring the water tightness of form.
4. Demonstrate how to fix tie rods, supports, bracings after the erection of formwork shutters.
5. Show how to perform checks for line, level, and alignment of the erected formwork as per permissible tolerance limits.
6. Show how to perform checks for dimensional accuracy and right angle, and take necessary corrective action if required.
7. Demonstrate the standard procedure for dismantling of formwork shutters manually or by mechanical means as per the requirements.
8. Show how to check the quality of formwork materials for reusability after dismantling.
9. Demonstrate proper storing, stacking, and cleaning of formwork materials after dismantling.

Say

In this unit of Erection and Dismantling, we will learn essential techniques for formwork construction and removal. By the end of this unit, you'll be equipped to properly position and support formwork using various methods, ensure water tightness, and fix necessary components. You'll also gain expertise in checking alignment, levelness, and dimensional accuracy, maintaining precision within tolerance limits. The unit covers the standard procedures for dismantling formwork shutters, assessing material quality for reusability, and proper storage and cleaning practices. These skills are fundamental for efficient and safe formwork construction projects, ensuring the quality and longevity of the structures being built.

Resources to be used

- Available objects such as whiteboard, duster, marker, notepad, pens, participant handbooks, computer, projector, flipcharts etc.
- PowerPoint slides, pictures/ posters depicting various information about Erection and Dismantling.

Ask

- In the context of formwork construction, why is it crucial to perform checks for alignment, levelness, and dimensional accuracy, and how can deviations from specified tolerances impact the overall construction project?
- Can you explain the key considerations and steps involved in dismantling formwork shutters manually or by mechanical means, and why is the assessment of formwork material quality post-dismantling important for future construction projects?

Elaborate

- Introduction and overview of resources.
- Use of supports such as runner pieces, timber, props, tie systems appropriately for positioning and providing support.
- Braces for formwork support as per the specification and requirement.
- Form sheet or other appropriate packing material for ensuring the water tightness of form.
- Fixing tie rods, supports, bracings after the erection of formwork shutters.
- Performing checks for line, level, and alignment of the erected formwork as per permissible tolerance limits.
- Procedure for dismantling of formwork shutters manually or by mechanical means as per the requirements.
- Quality of formwork materials for reusability after dismantling.
- Storing, stacking, and cleaning of formwork.

Let us do an activity to understand the above topics.

Activity-1

- **Topic:** Formwork Inspection and Preparation
- **Objective:** To reinforce the importance of proper formwork inspection and preparation before concrete pouring.
- **Instructions:**
 - ◆ Divide the participants into small groups.
 - ◆ Provide each group with a checklist based on the provided guidelines for erecting formwork.
 - ◆ Instruct each group to simulate an inspection and preparation process for a hypothetical formwork setup.

- ◆ **Ask each group to:**
 - Review the checklist and discuss its key points.
 - Assign roles within the group, such as an inspector, a formwork installer, and a safety officer.
 - Use the checklist to inspect and prepare the formwork, discussing potential issues or problems they might encounter.
- ◆ Encourage participants to actively engage in discussions, ask questions, and share insights during the simulation.
- ◆ After the simulation, have each group present their findings and discuss any challenges they encountered during the inspection and preparation process.
- ◆ Facilitate a group discussion to explore the significance of each checklist item in ensuring safe and efficient formwork erection.
- ◆ Emphasize the importance of adhering to these guidelines to avoid serious problems during and after concrete pouring.
- **Expected Outcome:** This activity allows participants to practically apply the provided guidelines and reinforces the importance of meticulous formwork inspection and preparation in construction projects. It promotes teamwork, problem-solving, and critical thinking in the context of formwork safety and efficiency.

Activity-2

- **Topic Name:** Formwork Removal Safety Checklist
- **Objective:** To reinforce the importance of safety and proper procedures during formwork removal.
- **Instructions:**
 - ◆ Divide the participants into small groups.
 - ◆ Provide each group with a safety checklist based on the provided guidelines for formwork removal.
 - ◆ Instruct each group to simulate a formwork removal process for a hypothetical construction scenario.
 - ◆ Ask each group to:
 - Review the safety checklist and discuss its key points.
 - Assign roles within the group, such as a safety officer, a formwork removal team, and a supervisor.
 - Use the checklist to plan and execute the formwork removal, discussing potential safety hazards and preventive measures.

- ◆ Encourage participants to actively engage in discussions, ask questions, and share insights during the simulation.
 - ◆ After the simulation, have each group present their findings and discuss any challenges they encountered during the formwork removal process.
 - ◆ Facilitate a group discussion to emphasize the importance of adhering to safety guidelines during formwork removal to prevent accidents and damage.
 - ◆ Emphasize the significance of gradual and cautious removal, proper equipment handling, and the role of each team member in ensuring a safe process.
- **Expected Outcome:** This activity allows participants to practically apply the provided safety guidelines and reinforces the importance of meticulous safety procedures during formwork removal in construction projects. It promotes teamwork, problem-solving, and critical thinking in the context of formwork safety and efficiency.

Activity-3



- **Topic Name:** Formwork Storage Organization Challenge
- **Objective:** To reinforce the importance of safe and organized storage of formwork materials.
- **Instructions:**
 - ◆ Divide the participants into small teams or pairs.
 - ◆ Provide each team with a set of formwork materials, which can include panels, plywood sheets, loose components (wailings, soldiers, struts, bolts, clamps, keys, pins, wedges, ties), and props (simulated props or representations).
 - ◆ Explain that each team's task is to organize and store these formwork materials properly in a simulated storage area.
 - ◆ Share the guidelines for safe formwork storage (as provided in the content) with all participants.
 - ◆ **Instruct each team to:**
 - Designate a team leader and assign roles for team members (e.g., organizing, stacking, labeling).
 - Apply the storage guidelines to organize and store the formwork materials in their designated storage area.
 - Ensure that the materials are protected from potential damage due to moisture, contamination, or mishandling.
 - Label and number the materials for easy matching in the future.
 - Elevate the props off the ground, if applicable.

- ◆ Set a time limit for this activity, depending on the complexity of the materials and the number of participants.
 - ◆ After the storage task is complete, have each team present their storage organization and explain their approach.
 - ◆ Facilitate a discussion on the importance of proper formwork storage and its impact on material longevity, reusability, and safety on construction sites.
 - ◆ Encourage participants to share any challenges they encountered during the organization process and how they addressed them.
- **Expected Outcome:** This activity allows participants to practically apply the guidelines for safe formwork storage and emphasizes the significance of organization and protection to prevent material damage. It promotes teamwork, problem-solving, and attention to detail in the context of formwork storage practices.

Say

Did you find this activity interesting? Can you see how much information you had previously and how much information you have now?

Do

- Jot down the crucial points on the whiteboard as the students speak.
- Share your input and insight to encourage the students and add onto what they talk about.
- Ensure that all students participate in the class.

Notes for facilitation

- Arrange the relevant handouts and leaflets for a better understanding of the topic:
- Arrange audio-visual aids to make them understand
- Ask the participants if they have any questions.
- Encourage every participant to answer those questions and encourage peer learning in the class.

Exercise

Key Solutions to PHB Exercise

A. Answers to the Questions:

- a) Name a defect that bamboo can be susceptible to due to changes in moisture content.

Splitting or cracking

- b) Name a versatile timber material used in shuttering works for creating smooth surfaces.

Plywood

- c) Which type of hitch is designed for attaching a rope to a cylindrical object like a bamboo or a pole?

Timber Hitch

B. Multiple Choice Questions:

1. b) Delamination
2. d) Columns
3. c) Plywood
4. d) Uniformity and strength
5. b) Create a loop at the end of a rope

C. Fill in the Blanks:

1. moisture
2. uneven
3. glue.
4. beams
5. Square Knot (Reef Knot)
6. lashings

Notes



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Skill India
कौशल भारत-कुशल भारत



सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP



N · S · D · C
National
Skill Development
Corporation

Transforming the skill landscape

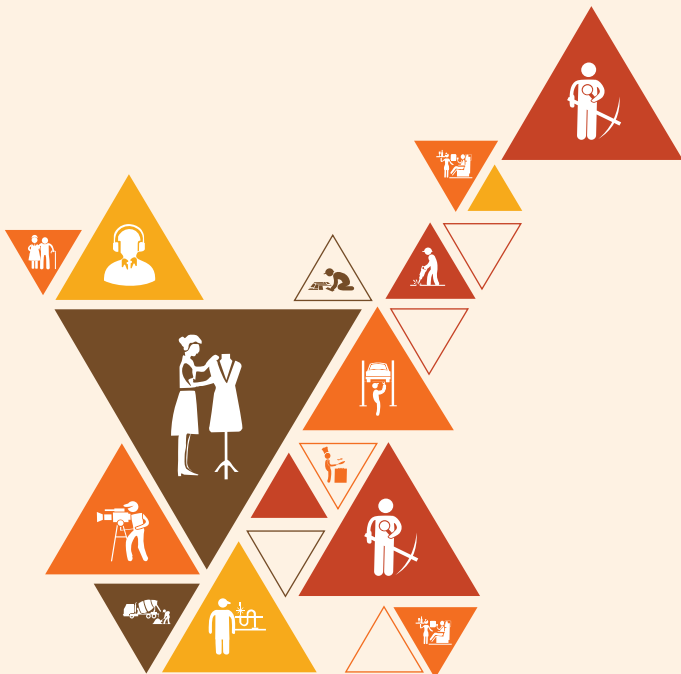


11. Annexures

Annexure I - Training Delivery Plan

Annexure II - Assessment Criteria

Annexure III - QR Codes –Video Links



Annexure I

Training Delivery Plan

Training Delivery Plan			
Program Name:	Shuttering Carpenter		
Qualification Pack Name & Ref. ID	CON/Q3001		
Version No.	2.0	Version Update Date	31/03/2022
Prerequisites to Training (if any)	Minimum Educational Qualification: 11th grade pass OR Completed 1st year of 3-year diploma (after 10th) and pursuing regular diploma OR 10th grade pass plus 1-year NTC/ NAC OR 8th grade pass plus 2-year NTC plus 1 Year NAC OR 10th grade pass with 2 Years of experience relevant experience OR 10th grade pass and pursuing continuous schooling OR 5th grade pass OR No formal education prescribed		
Training Outcomes	After completing this program, participants will be able to: <ul style="list-style-type: none"> • Make wooden shutters used in shuttering carpentry • Carry out quality check for shuttering works • Work effectively in a team to deliver desired results at the workplace • Plan and organize work to meet expected outcomes • Work according to personal health, safety and environment protocols at construction site • Discuss the applicable employability skills. • Assemble and dismantle system formwork for R.C.C structures • Assemble and dismantle conventional shuttering / formwork for RCC structures 		

Sl. No	Module	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/ Aids	Duration
1	Introduction to the Job Role of a Shuttering carpenter T- 08:00 (HH: MM)	1. Introduction to Construction Industry Role and Responsibilities of Shuttering carpenter	<ul style="list-style-type: none"> • Overview of construction industry • Explain role and responsibilities of shuttering carpenter. • Explain expected personal attributes required from this job role. • Discuss future possible progression and career options for shuttering carpenter. 	Bridge Module	Class-room lecture, games, group participation, group activity	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop	T- 02:00 T- 06:00
2	Make wooden shutters used in shuttering carpentry T- 13:00 P- 39:00 (HH: MM)	1. Interpreting Shuttering Work Drawings	<ul style="list-style-type: none"> • Interpret sketches and working drawings used for shuttering work 	CON/ N0302 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14 KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU14, KU15, KU16, KU17, KU18, KU19	Class-room lecture, games, group participation, group activity	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop Tools and Equipment Required:	T- 01:00 P- 05:00
		2. Hand and power tools	<ul style="list-style-type: none"> • Explain the use of different tools used for carpentry work. • Explain the handling and maintenance procedure of hand and power tools. • Explain the methods to select quality materials and tools as per requirement in carpentry work • List the safety precautions followed while using power tools for the preparation of shutters/ frames. 				T- 02:00 P- 06:00
		3. Features of Timber	<ul style="list-style-type: none"> • Explain the various features of different types of timber used in shuttering works. • Discuss about the seasoning of timber and common defects in timber. 				T- 02:00 P- 06:00

		4. Quality Checks for Plywood and Timber	<ul style="list-style-type: none"> • Explain the methods to select quality materials and tools as per requirement in carpentry work. • Discuss about the seasoning of timber and common defects in timber. • Discuss about the seasoning of timber and common defects in timber. 				T- 02:00 P- 06:00
		5. Prepare cutting plan	<ul style="list-style-type: none"> • Describe the sequence and standard practice of marking, laying out and cutting of form sheathing and stiffeners as per requirement for carpentry works. 				T- 02:00 P- 05:00
		6. Types of joints	<ul style="list-style-type: none"> • Explain the importance of using different types of joints such as dovetail joint, Tenon and mortise and lap joints. • Discuss the steps for the preparation of different types of joints used in wooden shutters. 				T- 02:00 P- 05:00
		7. Repair works for defects	<ul style="list-style-type: none"> • Perform repair works for defects on the prepared shutters as per instructions 				T- 02:00 P- 06:00

3	Carry out quality checks for shuttering works T- 18:00 P- 42:00 (HH:MM)	1. Interpreting Rough Sketches and Schematic Drawings	<ul style="list-style-type: none"> Interpret of the rough sketches / schematic working drawings/ cutting plans used in shuttering carpentry work. 	CON/ N0304 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13 KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU13, KU14, KU15, KU16	Class-room lecture, , group participation, group activity, field visit	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop	T- 03:00 P- 05:00
		2. Types of System Formwork and Conventional Formwork	<ul style="list-style-type: none"> Explain different types of system formwork/ conventional formwork 				T- 03:00 P- 05:00
		3. Materials and Components in Formwork	<ul style="list-style-type: none"> Describe the different types of material and components used in system formwork/ conventional formwork 				T- 02:00 P- 06:00
		4. Quality Checks in Formwork	<ul style="list-style-type: none"> Explain the various checks for plumb, level and alignment of the formwork. 				T- 02:00 P- 06:00
		5. Standards and Tolerance Limits	<ul style="list-style-type: none"> Describe the importance of Indian Standard / International codes and maximum tolerance limits for key quality checks State the sequence followed for quality checks 				T- 02:00 P- 05:00
		6. Different type of formwork support	<ul style="list-style-type: none"> Demonstrate the use of different type of support for formwork to ensure its stability. 				T- 02:00 P- 05:00

		7. Rectifying Shuttering Work	<ul style="list-style-type: none"> State the do's and don'ts required during rectification of shuttering works 				T- 02:00 P- 05:00
		8. Basics of Reinforcement, Shuttering, and Concreting	<ul style="list-style-type: none"> Explain the basics and fundamentals of reinforcement work, shuttering work and concreting works 				T- 02:00 P- 05:00
4	Work effectively in a team to deliver desired results at the workplace T- 08:00 P- 16:00 (HH:MM)	1. Effective communication skills	<ul style="list-style-type: none"> Explain the importance of effective communication. Explain the importance of effective communication. Describe the effects of poor communication 	CON/N8001 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9	Class-room lecture, games, group participation, group activity	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop	T- 03:00 P- 05:00
		2. Teamwork	<ul style="list-style-type: none"> Explain the importance of good teamwork Elucidate the 5Cs of teamwork Elucidate the consequence of poor teamwork 				T- 03:00 P- 05:00
		3. Working Effectively and Maintaining Discipline at Work	<ul style="list-style-type: none"> Explain the importance of creating healthy and cooperative work environment among the gangs of workers. Elucidate applicable techniques of work, properties of materials used, tools and tackles used, safety standards that co-workers might need as per the requirement. 				T- 03:00 P- 05:00

			<ul style="list-style-type: none"> • equipment and work fronts timely to interfacing teams. • Demonstrate ways to work together with co-workers in a synchronized manner. 				
		4. Inclusivity at work	<ul style="list-style-type: none"> • Discuss the fundamental concept of gender equality. • Explain how to recognise and be sensitive to issues of disability culture and gender. • Discuss legislation, policies, and procedures relating to gender sensitivity and cultural diversity including their impact on the area of operation. • Demonstrate effective implementation of gender-neutral practices at the workplace. • Demonstrate ways to address discriminatory and offensive behaviour in a professional manner as per organizational policy 				T- 01:00 P- 07:00
5	Plan and organize work to meet expected outcomes T- 08:00 P- 16:00 (HH:MM)	1. Setting Objectives	<ul style="list-style-type: none"> • Explain how to plan painting activities within defined scope and duration • Explain basic concept of productivity and sequence of working 	CON/ N8002 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12 KU1, KU2, KU3, KU4, KU5	Class-room lecture, games, group participation, group activity	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop	T- 03:00 P- 05:00
		2. Planning and Organizing work	<ul style="list-style-type: none"> • Explain how to plan painting activities within defined scope and duration • Explain basic concept of productivity and sequence of working 				T- 03:00 P- 05:00

		3. Organising resources	<ul style="list-style-type: none"> • Explain requisition of resources, reporting for requirement of resources orally and in written to concerned authority • Demonstrate requisition of resource citing an example • Demonstrate how to handle and organize painting tools, material, fixtures and devices for painting work. • Demonstrate how to prioritize all works/ activities • Demonstrate optimum utilization of resources citing an example 				T- 02:00 P- 06:00
6	Work according to personal health, safety and environment protocol at construction site T- 12:00 P- 24:00 (HH:MM)	1. Workplace hazards	<ul style="list-style-type: none"> • Explain the types of hazards at the construction sites Identify the hazards specific to the painting and decoration work • Recall the safety control measures and actions to be taken under emergency situation 	CON/ N9001 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14 KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU14	Class-room lecture, games, group participation, group activity, field visit	Training Kit- Trainer Guide, Presentations, White-board, Marker, Projector, Laptop Tools and Equipment Required: Safety Helmets, Face shield, Overalls, Knee pads, Safety shoes, Safety belts, Safety harness, Safety Gloves, Safety goggles, Particle masks, Ear Plugs,	T- 02:00 P- 04:00

						Reflective jackets, Fire Extinguisher, Fire prevention kit, First Aid box, Safety tags, Safety Notice board	
		2. Fire Extinguisher	<ul style="list-style-type: none"> • Explain the classes of fire and types of fire extinguishers • Demonstrate the operation of fire extinguisher. 				T- 02:00 P- 04:00
		3. First Aid and Workplace Safety	<ul style="list-style-type: none"> • Explain the classes of fire and types of fire extinguishers • Demonstrate the operation of fire extinguisher. • Demonstrate the use of all Personal Protective Equipment (PPE) like helmet, safety shoe, safety belt, safe jackets and other safety equipment 				T- 02:00 P- 04:00
		4. Housekeeping and Tool and Material Handling	<ul style="list-style-type: none"> • Describe the standard procedure for handling, storing and stacking of material, tools, equipment and accessories • Explain the types of ergonomic principles adopted while carrying out specific task at the construction • Explain the benefits of basic ergonomic principles used at construction sites. • Explain the importance of housekeeping Demonstrate housekeeping practice followed after painting and decoration works. 				T- 02:00 P- 04:00

		5. Waste Management	<ul style="list-style-type: none"> • Explain different types of wastes produced at a construction site including their disposal method • Explain the purpose and importance of vertigo test at construction site • Demonstrate vertigo test • List out basic medical tests required for working at construction Site 				T- 02:00 P- 04:00
		6. Medical Tests	<ul style="list-style-type: none"> • Explain the purpose and importance of vertigo test at construction site • Demonstrate vertigo test • List out basic medical tests required for working at construction Site 				T- 02:00 P- 04:00
7	Employability Skills (60 hours)	1. Introduction to Employability Skills Duration	<ul style="list-style-type: none"> • Discuss the Employability Skills required for jobs in various industries • List different learning and employability related GOI and private portals and their usage 	DGT/VSQ/ N0102		White-board and Markers Chart paper and sketch pens LCD Projector, Laptop for Presentation, audio visual aids, note pad, paper, pen, computers etc.	T- 01:30
		2. Constitutional values - Citizenship Duration	<ul style="list-style-type: none"> • Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen • Show how to practice different environmentally sustainable practices. 				T- 01:30

		<p>3. Becoming a Professional in the 21st Century Duration</p> <ul style="list-style-type: none"> • Discuss importance of relevant 21st century skills. • Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life. • Describe the benefits of continuous learning. 				T- 02:30
		<p>4. Basic English Skills Duration</p> <ul style="list-style-type: none"> • Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone • Read and interpret text written in basic English • Write a short note/ paragraph / letter/e-mail using basic English 				T- 10:00
		<p>5. Career Development & Goal Setting Duration</p> <ul style="list-style-type: none"> • Create a career development plan with well-defined short- and long-term goals 				T- 02:00
		<p>6. Communication Skills Duration</p> <ul style="list-style-type: none"> • Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette. • Explain the importance of active listening for effective communication 				T- 05:00

			<ul style="list-style-type: none"> • Discuss the significance of working collaboratively with others in a team 				
		7. Diversity & Inclusion Duration	<ul style="list-style-type: none"> • Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD • Discuss the significance of escalating sexual harassment issues as per POSH act. 				T- 02:30
		8. Financial and Legal Literacy Duration	<ul style="list-style-type: none"> • Outline the importance of selecting the right financial institution, product, and service • Demonstrate how to carry out offline and online financial transactions, safely and securely • List the common components of salary and compute income, expenditure, taxes, investments etc. • Discuss the legal rights, laws, and aids 				T- 05:00
		9. Essential Digital Skills Duration	<ul style="list-style-type: none"> • Describe the role of digital technology in today's life • Demonstrate how to operate digital devices and use the associated applications and features, safely and securely • Discuss the significance of displaying responsible online behavior while browsing, using various social 				T- 10:00

	<ul style="list-style-type: none"> • media platforms, e-mails, etc., safely and securely • Create sample word documents, excel sheets and presentations using basic features • utilize virtual collaboration tools to work effectively 				
10. Entrepreneurship Duration	<ul style="list-style-type: none"> • Explain the types of entrepreneurship and enterprises • Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan • Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement • Create a sample business plan, for the selected business opportunity 				T- 07:00
11. Customer Service Duration	<ul style="list-style-type: none"> • Describe the significance of analysing different types and needs of customers • Explain the significance of identifying customer needs and responding to them in a professional manner. • Discuss the significance of maintaining hygiene and dressing appropriately 				T- 05:00
12. Getting Ready for Apprenticeship & Jobs Duration	<ul style="list-style-type: none"> • Create a professional Curriculum Vitae (CV) • Use various offline and online job search sources such as employment exchanges, recruitment agen 		Class-room lecture, discussion, Demonstration,		T- 08:00

			<ul style="list-style-type: none"> • cies, and job portals respectively • Discuss the significance of maintaining hygiene and confidence during an interview • Perform a mock interview • List the steps for searching and registering for apprenticeship opportunities 		practical, Team Activity: Role play, video session		
8	On the Job Training	On the Job Training	<ul style="list-style-type: none"> • Mastering Shuttering Carpentry: Skills, Quality Checks, Communication, Organization, and Safety 		On the job training at Work place	On the Job Training	P: 30:00
9	Assemble and dismantle system formwork for RCC structures T- 54:00 P- 126:00 (HH:MM)	1. Introduction to System Formwork	<ul style="list-style-type: none"> • Discuss about system formwork and its types. 	CON/ N0303 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19, PC20, PC21, PC22 KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU14, KU15, KU16	Class-room lecture, discussion, Demonstration, practical, Team Activity: Role play, video session	Training Kit- Trainer Guide, Presentations, Whiteboard, Marker, Projector, Laptop	T- 03:00 P- 05:00
		2. Types of System Formwork	<ul style="list-style-type: none"> • Discuss about system formwork and its types. 				T- 03:00 P- 05:00
		3. Conventional vs. System Formwork	<ul style="list-style-type: none"> • Describe the difference between conventional and system formwork. 				T- 03:00 P- 05:00
		4. Shuttering Materials	<ul style="list-style-type: none"> • List the various types of shuttering material 				T- 03:00 P- 05:00
		5. Consumables in Shuttering Work	<ul style="list-style-type: none"> • Discuss about consumables used in shuttering work 				T- 03:00 P- 05:00
		6. Releasing Agents in Formwork	<ul style="list-style-type: none"> • Explain different types of releasing agents 				T- 03:00 P- 05:00
		7. Pre-Assembly Checks	<ul style="list-style-type: none"> • Perform checks prior to erection/use of system formwork. 				T- 03:00 P- 05:00

		8. Estimating Shuttering Material Requirements	<ul style="list-style-type: none"> Determine shuttering materials required for work. 				T- 03:00 P- 05:00
		9. Reading of Schematic Working Drawings	<ul style="list-style-type: none"> Demonstrate reading of schematic working drawing for shuttering works. 				T- 02:00 P- 06:00
		10. Assembling System Formwork	<ul style="list-style-type: none"> Discuss the standard procedure for assembling and dismantling of system formwork 				T- 02:00 P- 06:00
		11. Erection of Formwork for Column	<ul style="list-style-type: none"> Demonstrate assembling of system formwork for R.C.C footing. 				T- 02:00 P- 06:00
		12. Erection of Formwork for Wall	<ul style="list-style-type: none"> Demonstrate assembling of system formwork for R.C.C column 				T- 02:00 P- 06:00
		13. Erection of Formwork for Footing	<ul style="list-style-type: none"> Demonstrate assembling of system formwork for R.C.C wall.. 				T- 02:00 P- 06:00
		14. Erection of Formwork for Beam and Slab	<ul style="list-style-type: none"> Demonstrate assembling of system formwork for R.C.C beam and slab. 				T- 02:00 P- 06:00
		15. Formwork Support	<ul style="list-style-type: none"> Discuss the use of formwork support. 				T- 02:00 P- 06:00
		16. Quality Checks	<ul style="list-style-type: none"> Perform checks on system formwork. 				T- 02:00 P- 06:00

		17. Standard Tolerance Limits	<ul style="list-style-type: none"> State general tolerance limit for shuttering works. 				T- 02:00 P- 06:00
		18. Dismantling System Formwork	<ul style="list-style-type: none"> Demonstrate dismantling of system formwork for R.C.C footing, column, wall, beam and slab. 				T- 02:00 P- 06:00
		19. Shuttering Removal Time	<ul style="list-style-type: none"> State general removal time for shuttering works. 				T- 02:00 P- 06:00
		20. Formwork Repair	<ul style="list-style-type: none"> Describe the procedure for repairing the formwork. 				T- 02:00 P- 05:00
		21. Lifting Gears in Formwork	<ul style="list-style-type: none"> Discuss the use of lifting gears for shifting and fixing of formwork 				T- 02:00 P- 05:00
		22. Stacking Formwork Components	<ul style="list-style-type: none"> Explain the standard procedure for stacking and storing of formwork components. 				T- 02:00 P- 05:00
		23. Storing Formwork Components	<ul style="list-style-type: none"> Explain the standard procedure for stacking and storing of formwork components. 				T- 02:00 P- 05:00
10	Assemble and dismantle conventional shuttering / formwork for RCC structures T- 54:00 P- 126:00 (HH:MM)	1. Interpreting Sketches and Schematic Drawings,	<ul style="list-style-type: none"> Interpret sketches / schematic working drawing/ cutting plan relevant to shuttering work. 	CON/ N9001 PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC8, PC9, PC10, PC11, PC12, PC13, PC14, PC15, PC16, PC17, PC18, PC19	Class-room lecture, discussion, Demonstration, practical, Team Activity: Role play, video session		T- 03:00 P- 05:00

	2. Conventional Formworks	<ul style="list-style-type: none"> Discuss about conventional formworks. 	KU1, KU2, KU3, KU4, KU5, KU6, KU7, KU8, KU9, KU10, KU11, KU12, KU14, KU15, KU16, KU17, KU18, KU19			T- 03:00 P- 05:00
	3. Hand and Power Tools	<ul style="list-style-type: none"> Discuss the importance of handling of hand and power tools and their basic maintenance. 				T- 03:00 P- 05:00
	4. Defects in Bamboo, Ballies, Timber, and Plywood	<ul style="list-style-type: none"> Discuss the defects in bamboo, ballies, timber and plywood etc. 				T- 03:00 P- 05:00
	5. Application of Timber	<ul style="list-style-type: none"> Explain the application of different types of timber and non-timber materials used in different shuttering works. 				T- 03:00 P- 05:00
	6. Standard Shapes and Sizes of Carpentry Tools	<ul style="list-style-type: none"> Discuss the standard shape and size of carpentry tools. 				T- 03:00 P- 05:00
	7. Conventional Shuttering Materials	<ul style="list-style-type: none"> Discuss the use of different types of material used in conventional shuttering works. 				T- 03:00 P- 05:00
	8. Pre-Assembly Checks	<ul style="list-style-type: none"> Perform check prior to erection/use of conventional formwork. 				T- 03:00 P- 05:00
	9. Components of Conventional Formwork	<ul style="list-style-type: none"> Discuss the various components of the conventional formwork such as pipes, coupler, tying thread and other fixtures. 				T- 02:00 P- 06:00
	10. Steps for Erection and Bracing of Formwork	<ul style="list-style-type: none"> Discuss the sequential steps for erection and bracing of formwork, as per standard procedure. 				T- 02:00 P- 06:00

		11. Method Statement for Erection of Conventional Staging	<ul style="list-style-type: none"> Explain the method statement used for the erection of conventional staging using bamboo, ballies, pipe and coupler. 				T- 02:00 P- 06:00
		12. Timber and non-timber materials	<ul style="list-style-type: none"> Explain the application of different types of timber and non-timber materials used in different shuttering works. 				T- 02:00 P- 06:00
		13. Checks for Plumb, Level, and Alignment	<ul style="list-style-type: none"> Explain the application of different types of timber and non-timber materials used in different shuttering works. 				T- 02:00 P- 06:00
		14. Releasing Agent	<ul style="list-style-type: none"> Explain the properties and method of application of release agents. 				T- 02:00 P- 06:00
		15. Use of Supports	<ul style="list-style-type: none"> Use the supports such as runner pieces, timber, props, tie systems appropriately for positioning and providing support 				T- 02:00 P- 06:00
		16. Braces for Formwork Support	<ul style="list-style-type: none"> Use the supports such as runner pieces, timber, props, tie systems appropriately for positioning and providing support 				T- 02:00 P- 06:00
		17. Ensuring Water Tightness	<ul style="list-style-type: none"> Use form sheet or other appropriate packing material for ensuring the water tightness of form. 				T- 02:00 P- 06:00

		18. Fixing Tie Rods, Supports, and Bracings	<ul style="list-style-type: none"> • Demonstrate how to fix tie rods, supports, bracings after erection of formwork shutters. 				T- 02:00 P- 06:00
		19. Tolerance Limits	<ul style="list-style-type: none"> • Demonstrate how to fix tie rods, supports, bracings after erection of formwork shutters. 				T- 02:00 P- 06:00
		20. Dismantling Formwork	<ul style="list-style-type: none"> • Explain the sequential step for dismantling of conventional formwork shutters. 				T- 02:00 P- 05:00
		21. Lifting Gears in Formwork	<ul style="list-style-type: none"> • Demonstrate the standard procedure for dismantling of formwork shutters manually or by mechanical means as per the requirements 				T- 02:00 P- 05:00
		22. Stacking Formwork Components	<ul style="list-style-type: none"> • Demonstrate proper storing, stacking and cleaning of formwork materials after dismantling 				T- 02:00 P- 05:00
		23. Storing Formwork Components	<ul style="list-style-type: none"> • Demonstrate proper storing, stacking and cleaning of formwork materials after dismantling 				T- 02:00 P- 05:00

Annexure - II

Assessment Guidelines and Assessment Weightage	
Job Role	Shuttering Carpenter
Qualification Pack	CON/Q3001
Sector Skill Council	Construction Skill Development Council of India

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3	Individual assessment agencies will create unique question papers for knowledge/theory part for assessment of candidates as per assessment criteria given below
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion
5	The passing percentage for each QP will be 70%. To pass the Qualification Pack, every trainee should score a minimum of 70% individually in each NOS.
6	The Assessor shall check the final outcome of the practices while evaluating the steps performed to achieve the final outcome.
7	The trainee shall be provided with a chance to repeat the test to correct their procedures in case of improper performance, with a deduction of marks for each iteration.
8	After the certain number of iteration as decided by SSC the trainee is marked as fail, scoring zero marks for the procedure for the practical activity.
9	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack within the specified timeframe set by SSC.
10	Minimum duration of Assessment of each QP shall be of 4hrs/trainee.

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N0302.Make wooden shutters used in shuttering carpentry	30	70	-	-	100	20
CON/N0304.Carry out quality check for shuttering works	30	70	-	-	100	15
CON/N8001.Work effectively in a team to deliver desired results at the workplace	30	70	-	-	100	10
CON/N8002.Plan and organize work to meet expected outcomes	30	70	-	-	100	10
CON/N9001.Work according to personal health, safety and environment protocol at construction site	30	70	-	-	100	10
DGT/VSQ/N0102- Employability Skills (60 Hours)	20	30	-	-	50	5
Total	230	520	-	-	750	100

Elective 1: System







National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N0303.Assemble and dismantle system formwork for R.C.C structures	30	70	-	-	100	30
Total	30	70	-	-	100	30







Elective 2: System




National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
CON/N0315.Assemble and dismantle conventional shuttering / formwork for RCC structures	30	70	-	-	100	30
Total	30	70	-	-	100	30

Annexure-III

Annexure of QR Codes for Shuttering Carpenter

Chapter Name	Unit Name	Topic Name	URL	QR Code
Chapter 1: Introduction of Construction Sector and Job Role	UNIT 1.1 - Introduction to Construction Industry	Overview of Construction Sector in India	https://youtu.be/p4f-0Ni15EaM?si=FLKuZWQ7vm-2dLZ9N	 Overview of Construction Sector in India
	UNIT 1.3 - Brief about Shuttering Carpenter	Responsibilities of Shuttering Carpenter	https://youtu.be/YLN-KCMRUE?si=3c6Pb-P_w4rGkBae	 Responsibilities of Shuttering Carpenter
Chapter 2: Core/Generic Skills	Unit 2.1 - Basic principles of measurement, Geometry, and arithmetic Calculation	Different System of Measurement	https://youtu.be/H1xo5UVJKVo	 Different System of Measurement
		Area, volume and perimeter of geometrical shapes	https://youtu.be/OhTubw4C0to	 Area, volume and perimeter of geometrical shapes
Chapter 3: Making Wood- en Shutters Used in Shutter- ing Carpentry (CON/N0302)	Unit 3.1 - Hand and Power Tools	Construction Tools	https://www.youtube.com/watch?v=dERDiuZiHIM	 Construction Tools
	UNIT 3.2 - Measuring Instruments	Using of Spirit Level	https://youtu.be/FxV940bk-G2Y?feature=shared	 Using of Spirit Level

	UNIT 3.3 - Handling and Maintenance of Tools	Care and Maintenance of hand tools	https://youtu.be/UH0BaZU-FUEE?feature=shared	 <p>Care and Maintenance of hand tools</p>
	UNIT 3.4 - Shutter Panel Materials – System	Shuttering Panel Material	https://www.youtube.com/watch?v=SDYRICOTRSs	 <p>Shuttering Panel Material</p>
Chapter 4: Quality Checks on Shuttering Work (CON/N0304)	Unit 4.1 - Carry Out Quality Check for Shuttering Works	Design and Tolerance in Shuttering	https://youtu.be/t2q8jzkH-K8E?feature=shared	 <p>Design and Tolerance in Shuttering</p>
	Unit 4.2 - Checks on Reinforcement Work, Shuttering Work and Concreting Works	Checklist for Site Supervision of Concreting Work	https://www.youtube.com/watch?v=q2JsyYB0Tel	 <p>Checklist for Site Supervision of Concreting Work</p>
Chapter 9: Assemble and Dismantle System Formwork (Elective-1) (CON/N0303)	Unit 9.2: Assemble and Dismantle System Formwork	Assembling of System Formwork	https://www.youtube.com/watch?v=xXSuzfOfptA	 <p>Assembling of System Formwork</p>
	Unit 9.4: Stripping Time of Formwork	Stripping Time of Formwork	https://www.youtube.com/watch?v=gzWdR1wmBHU	 <p>Stripping Time of Formwork</p>

	Unit 9.6: Stacking and Storing of Formwork Panels	Stacking and Storing of Material	https://www.youtube.com/watch?v=-P-VHYX7Hhw	 Stacking and Storing of Material
Assembling and dismantling conventional shuttering / formwork for RCC structures (Elective-2) (CON/N0315)	Unit 10.1: Conventional Formwork	Formwork/ Conventional Shuttering Support	https://www.youtube.com/watch?v=RS8rmMTdhHQ	 Formwork/Conventional Shuttering Support
	Unit 10.3: Erection and Dismantling	Dismantling Formwork	https://www.youtube.com/watch?v=bA1KGJ4oDh0	 Dismantling Formwork





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